STEEL

The Metalworking Weekly

SEPTEMBER 19, 1960

A PENTON PUBLICATION

How to Engineer For Competition

That topic will highlight the meeting of the Association of Iron & Steel Engineers in Cleveland next week.

S. C. Read, AISE president, and director of construction and maintenance, Jones & Laughlin Steel Corp., thinks that the steelmaking advances of the past decade augur well for continued gains that will help the steel industry battle competition.

An evaluation of the present and future of the industry is presented in a special section starting on Page 139.

Forgers Are Operating at 27% Of Capacity, But Fighting Back

What It's Like to Amputate 40% Of Your Sales Volume—A Case Study

How Design Research Pays Off

Sheet Steel Shipments Will Hit 6.5 Million Tons in 4th Quarter

CONTENTS—TURN PAGE

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. . . a high-precision drilling machine designed for fully automatic NUMERICAL CONTROL OF ALL FUNCTIONS

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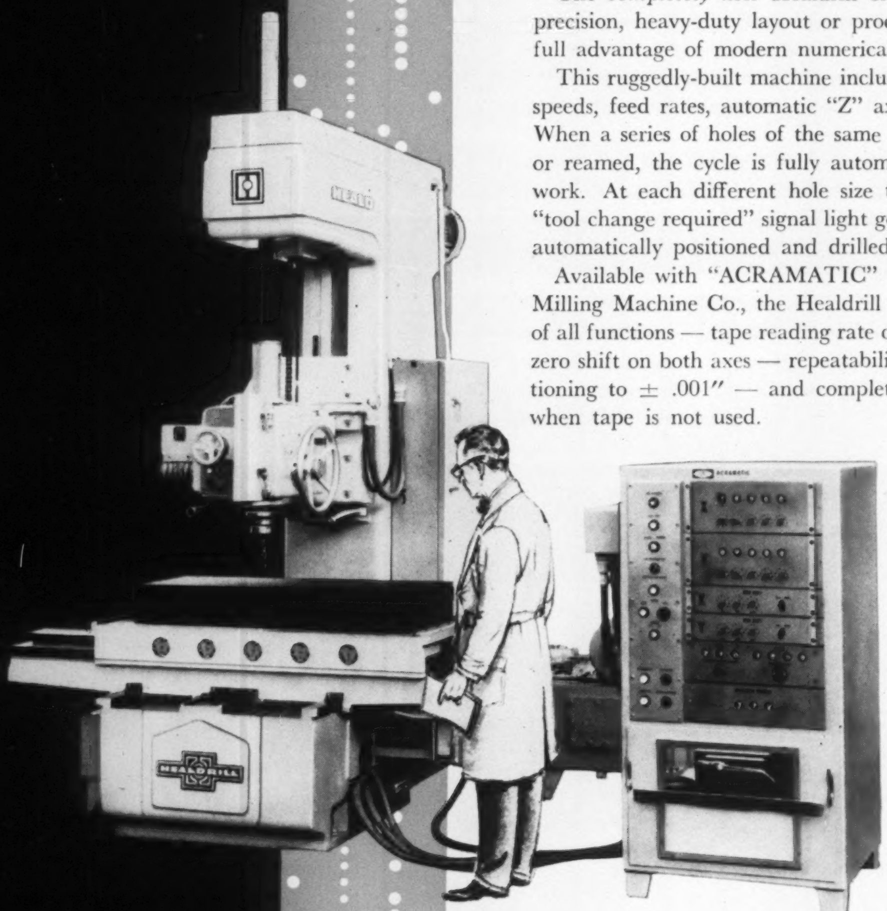
This ruggedly-built machine includes tape control of table positioning, speeds, feed rates, automatic "Z" axis cycle and tool-change indication. When a series of holes of the same size are to be drilled, counter-bored or reamed, the cycle is fully automatic, freeing the operator for other work. At each different hole size the cycle stops automatically and a "tool change required" signal light goes on. After change is made, hole is automatically positioned and drilled at correct feed and speed.

Available with "ACRAMATIC" punched tape control by Cincinnati Milling Machine Co., the Healdrill permits simple, direct programming of all functions — tape reading rate of 1200 lines per minute — full range zero shift on both axes — repeatability of ± .0002″ — accuracy of positioning to ± .001″ — and complete manual control from the console when tape is not used.



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This Week in STEEL

The Metalworking Weekly

September 19, 1960 Vol. 147 No. 12

Forgers Operate at 27 Per Cent, Fighting Back

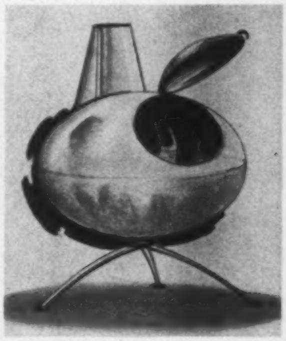
"We're overbuilt, but underfed." That's the way one forging company executive describes the plight of the forging industry, where only 27 per cent of its facilities are being utilized. Profits are being squeezed. Imports are hurting. This industry's problems parallel those of others. Take a look at what they're doing to fight back; you may find some ideas you can use in your competitive struggles. PAGE 95

Champion Amputates 40 Per Cent of Sales Volume

What do you do when a product that accounts for 40 per cent of your sales volume slides into the red dollarwise even though sales for that item tonnagewise have been boosted 30 per cent in five years? You probably would have to display the same sort of courage required of Champion Rivet Co.'s management. It dropped the profitless product. Result: A two-year peak in the firm's profits on a much lower sales base. Aim: Regain sales volume on remaining products. PAGE 100

How Design Research Pays Off

Most of today's industrial equipment is poorly designed both from the standpoint of appearance and function, says the head of a New York industrial design firm. Metalworkers can use design research to help them develop new products, improve old ones. It's an aid to better engineering, styling, and packaging. It also can help in developing a corporate image and in effecting production economies. A sample of what can be done in styling in steel is shown in the photo. What appears to be a type of flying saucer is a backyard incinerator. PAGE 105



We Must 'Engineer' for Competition

In dedicating this week's special AISE section to the engineers who will be meeting in Cleveland Sept. 27-30, STEEL's Editor Walter Campbell asserts the engineers must share a man-sized responsibility with producers in "engineering" steel to meet foreign competition. Special articles tell how this country's share of world steel production has fallen, how U. S. firms will concentrate on improving finishing facilities, now that capacity is sufficient (for awhile), how producers are turning out new products in anticipation of and to meet the needs of customers, what U. S. and Canadian producers are doing to fight competition from abroad, what steel company executives have to say about the industry's technological needs and progress, and what an American expert thinks about automation efforts in the Russian steel industry. PAGE 139

Pinch on Sheet Steel Users Will Be Slight

Users of steel sheets will have no supply or delivery problems this fall, in contrast to some post-Labor Day periods in recent years. The only pinch likely to develop is for users who have been shopping for overnight delivery. They may have to be satisfied with "normal" delivery as the fourth quarter develops. PAGE 201

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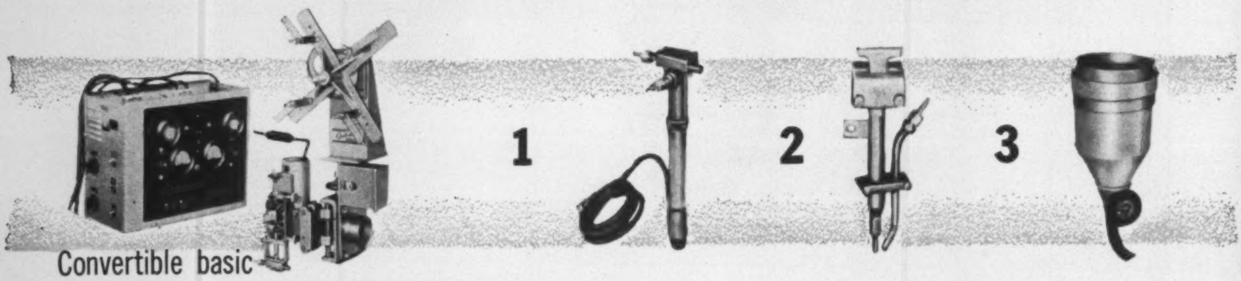

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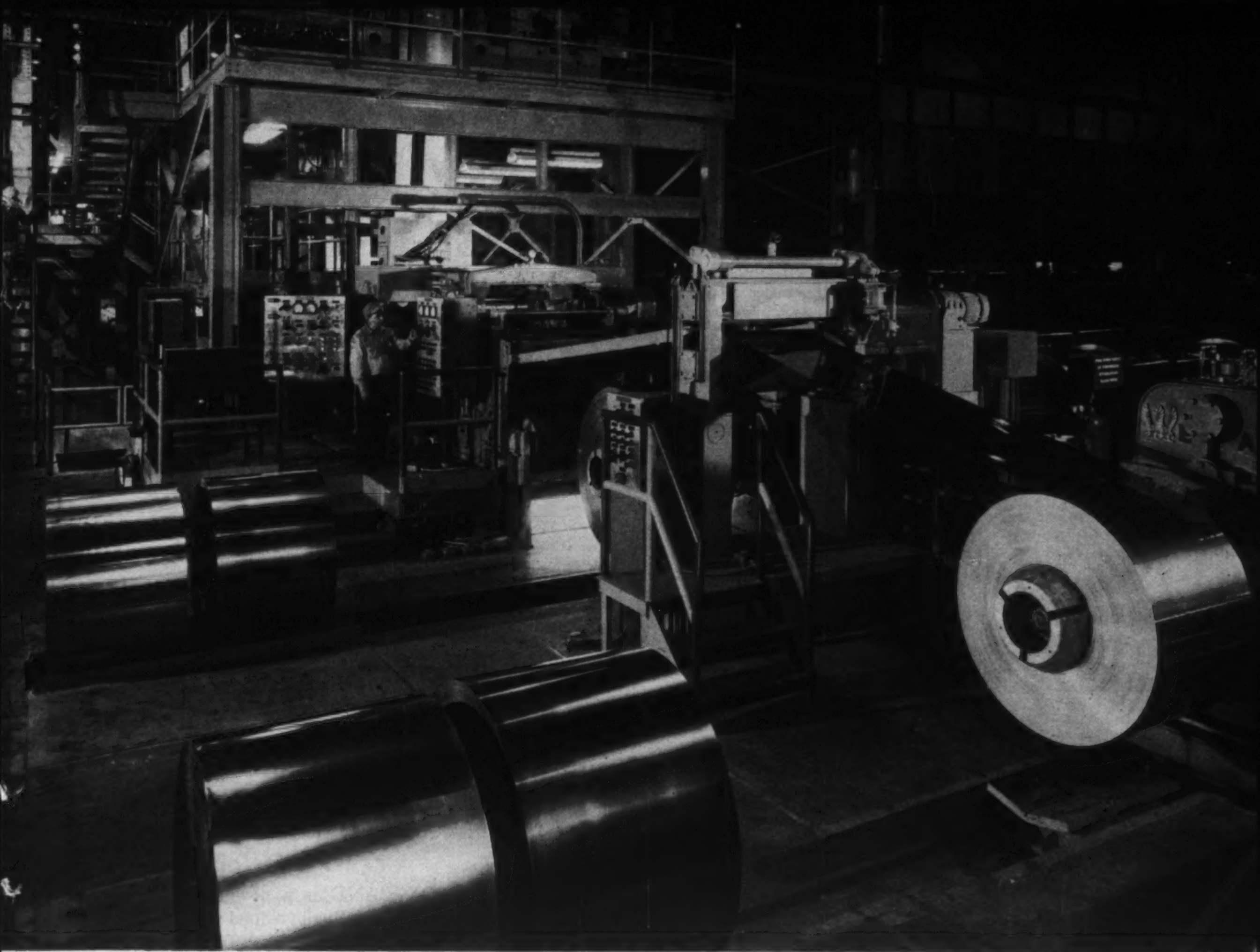

Columbia-Geneva Steel increases tin plate production with third Wean Electrolytic Tinning Line

A third Wean Electrolytic Tinning Line was installed recently by Columbia-Geneva Steel Division of United States Steel Corporation to meet the growing demand for high-quality tin plate on the West Coast. This high-speed "Ferrostan" line incorporates the most modern engineering advances in design and construction of continuous processing lines.

This modern line is among the first to employ an electronic data-logging system to provide a "process profile" of all coiled tin plate. Other new features include improved conductor roll mountings for more rigid support, easily replaced cartridge seals for submerged rolls, and air cylinder-controlled hold-down rolls for faster, more convenient adjustment.

Exit end equipment provides for both recoiling and shearing. A pay-off reel is included to permit shearing and classification of finished coils while the strip being processed is recoiled.

Fifty-one of the world's electrolytic tinning lines carry the Wean name and process over 80% of all electrolytic tin plate produced today. Wean's pioneer experience in continuous processing line equipment has served every major steel firm during the past thirty years. Wean's experience and "creative engineering" stand ready to serve you.

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- Cuts a wider range of metals including many tough alloy steels.
- Improved hot hardness and abrasion resistance permits faster speeds, heavier feeds.
- Eliminates investment in expensive, special equipment.

Starrett ALLOY BAND is a new double carbide special alloy band saw blade developed for one purpose only — *faster, more economical cutting and greatly extended cutting capability from standard band saw machines.*

Improved hot hardness and abrasion resistance permits higher speeds and heavier feeds on standard machines . . . extends the range of materials that can be cut including many of the tougher alloy steels . . . gives greater blade life with less blade changing and reduced down time.

Standard band saw machines can be operated at close to maximum efficiency with Starrett ALLOY BAND . . . saving up to 50% in cut-off costs and eliminating the need for expensive, special equipment.

Starrett ALLOY BAND can be used in many cases on high speed band saw machines for which we also recommend Starrett Safe-Flex® High Speed Steel Band Saw Blades.

For complete information on the new Starrett ALLOY BAND, see your Starrett Industrial Supply Distributor — or write Dept. BG, The L. S. Starrett Company, Athol, Massachusetts, U.S.A.

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STEEL

Servicenter

Please direct all correspondence to attention of Ed Service, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

September 19, 1960

'Why Free Engineering?' . . .

. . . questioned the headline on the July 25 editorial, by Editor-in-Chief Irwin H. Such. Responses from readers indicate some people would rather have *fee* engineering.

Frederic O. Hess, president, Selas Corp. of America, Dresher, Pa., writes: "One of the major steel companies had a problem. We discussed it; offered several designs, and made three special trips to the plant. The last design was accepted . . . and a quotation requested. Now the purchasing agent wishes to buy the furnace on the basis of just brick and steel without any allowance for expenses . . . or granting us a reasonable engineering overhead."

One Solution . . .

. . . among many, was proposed by W. A. Morton, president, Loftus Engineering Corp., Pittsburgh. Said he: ". . . The problem . . . can be solved if the entire group of engineering suppliers form an association and require certified specifications, prepared by a registered engineer, approved and paid for by a potential purchaser before the 'lambs' are sold. They then may continue to cut each other's throats as in the past, but with less blood letting collectively . . ."

STEEL continues to explore the question of free engineering as well as develop courses of action in this week's editorial, Page 91.

Perspiration on Ice . . .

. . . that about describes the feelings of Editors Ed Case (left) and Bob Huber when they collaborated on the progress report about cryogenics that you'll be reading next week in STEEL.

In a semiwilted fashion, Ed asked: "Have you ever tried writing, during the hottest days in August, about the behavior of metals near absolute zero? I took ten trips to the water fountain before stashing a carafe on my desk."

The editors surveyed major manufacturers, research laboratories, and universities to pinpoint the state of the art in cryogenics and also determine trends. They looked for effects of supercold on metallurgy and metalworking markets.

Get the word next week. Ed and Bob guarantee you'll warm up to the subject.

The Social Graces

My mother-in-law, bless her, is able to alienate a room full of people by uttering one sentence. If a plumber, a doctor, a lawyer, and an editor are present, she's liable to say: "If you can believe what you read in the newspapers, and I seldom do, the already high cost of medical treatment is going up, and it'll take a Philadelphia lawyer to figure the ins and outs of hospitalization plans . . . the plans must be worked up by a group of lefthanded plumbers."

That's mother-in-law—cliches and all.

The effects of her last visit must have lingered with us. Here's what happened.

The Entanglement

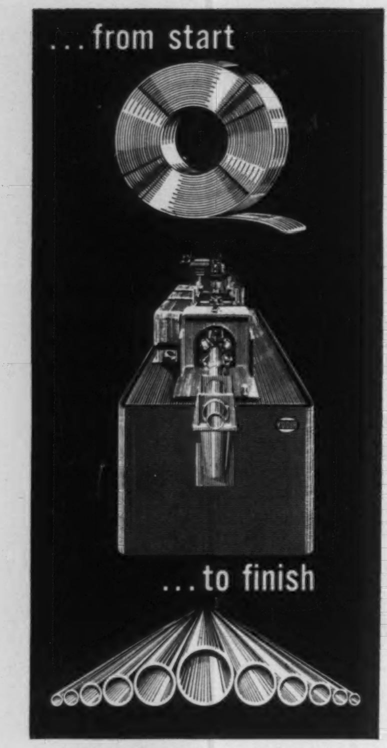
In the Aug. 1 Servicenter, we wrote about foreign threats to domestic bearing producers, one in particular: "Remember Usa? It's the Japanese town that was renamed so products from there could be exported with the words 'Made in USA' stamped on them. Well, now Usa, is headquarters for a bearing firm named Timke . . ."

Over the years, we've heard that story from many sources, the latest was an officer of a large bearing manufacturing company. In repetition, the story acquired a patina of credibility. When we published it, the item drew responses from a number of people.

We Heard From . . .

. . . Meyer Bernstein, international affairs representative, United Steelworkers of America, Washington, who sent a clipping of the item to the International Metal Workers Federation in Japan. A representative of the IMWF went to the Japan Bearing Manufacturers Association and the All Japan Machinery & Metal Workers Union.

The degree of care with which the Japanese investigated the item is indicative of the concern



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they have for their reputation as manufacturers and world traders.

They checked trademarks used for export and didn't find one for Timke . . . The Japan Bearing Inspection Association inspects all export shipments, and it couldn't find one listed . . . the Ministry of International Trade & Industry approves bearings for exports, and found no listing; in fact, the marking "Made in Japan" is required to get approval . . . the marking can't be similar to any U. S. trademark . . . records of the Japan Anti-friction Bearing Export Inspection Association were searched, and no such marking was uncovered . . . personnel at the U. S. Embassy in Tokyo said unless a bearing has a "Japan" marking, it will not go through U. S. Customs, and if "Timke" is marked it will not be acceptable . . . the city Usa has been in Kyushu for 1000 years, never had a name change, and has no bearing manufacturer.

Test of Character

"Thank you for the opportunity to participate in STEEL's contest," writes J. W. Wilcock, division manager, Sturtevant Div., Westinghouse Electric Corp., Hyde Park, Mass., and top winner in our June Usership Idea of the Month Contest.

"I think this is the first contest I ever won, and I stopped cutting out boxtops some years ago. Perhaps I need to find contests that have a little more character to them than the kind usually run today . . ."

You Can Win $1000 This Month . . .

. . . in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month — September, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted— **you will win $500.**

There's more . . . you will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month award.

Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

You can enter as many times as you wish. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Nov. 1.**

. . . Fluid Power news

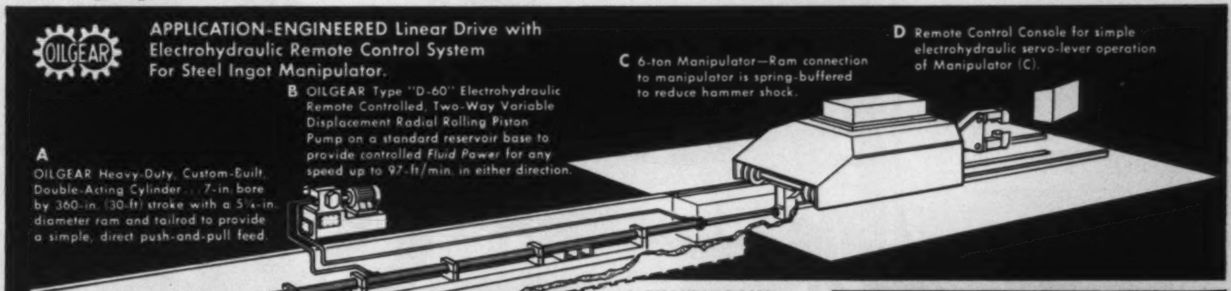
REPORT
NO. 11,801
REMOTE
CONTROLLED
INGOT
MANIPULATOR

From Oilgear *Application-Engineering* Files

HOW OILGEAR DRIVE SYSTEM ON INGOT MANIPULATOR IMPROVES CONTROL—CUTS DOWNTIME

DATA: Replace an electric variable speed drive on a 6-ton ingot manipulator because of excessive maintenance downtime, high rebuilding and replacement costs. Initial replacement plans called for a hydraulic variable speed drive directly to manipulator wheels, retaining customary practice of operators riding on manipulator. A job study revealed that while feeding an ingot under the open frame steam hammer, forward motion is momentarily stopped by each hammer impact—frequently bouncing manipulator wheels in the air, causing traction, speed control, shock, and operator fatigue problems.

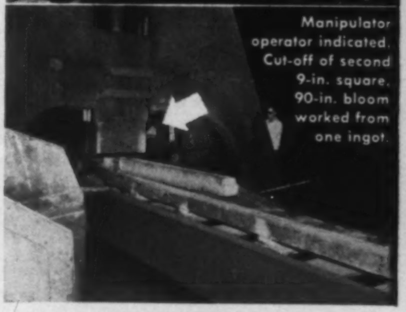
Basic Manipulator Drive Requirements were re-evaluated as follows: 1. Remove drive from manipulator to reduce shock-provoked maintenance downtime. **2.** Drive to be independent of wheel traction to improve feed and control. **3.** Provide stepless, remote speed control from zero to maximum in both directions. **4.** Withstand severe shock, vibration, heat, and dust on a continuous 16-hour day basis. **5.** Reduce operating, maintenance, and installation costs. **6.** Provide for future incorporation of hammer control with remote manipulator console.


OILGEAR
APPLICATION-ENGINEERED Linear Drive with Electrohydraulic Remote Control System For Steel Ingot Manipulator.
A OILGEAR Heavy-Duty, Custom-Built, Double-Acting Cylinder . . . 7-in. bore by 360-in. (30-ft) stroke with a 5¼-in. diameter ram and tailrod to provide a simple, direct push-and-pull feed.
B OILGEAR Type "D-60" Electrohydraulic Remote Controlled, Two-Way Variable Displacement Radial Rolling Piston Pump on a standard reservoir base to provide controlled *Fluid Power* for any speed up to 97-ft/min. in either direction.
C 6-ton Manipulator—Ram connection to manipulator is spring-buffered to reduce hammer shock.
D Remote Control Console for simple electrohydraulic servo-lever operation of Manipulator (C).

HOW IT WORKS

Through a simple, finger-tip lever on Console (D), operator remotely controls both volume and direction of fluid flow from Oilgear Variable Displacement Two-Way Pump (B) directly to either end of Oilgear Custom Cylinder (A). Only two pipe lines are required. Power input is used only in proportion to work performed, as no pump output power is wasted in direction control valves, external relief valves, flow control valves, auxiliary components, or excessive piping. Stepless, infinitely variable, smooth, steady manipulator speeds are instantly available in either direction. Fluid flow and pressure decelerate to zero as flow direction is changed—flow and pressure then accelerate to any selected amount in the new direction . . . reversal is smooth-cushioned — shock is eliminated. Controlled acceleration and deceleration; hydrodynamic braking; automatic pressure and flood lubrication; continuous filtration of power fluid . . . all are inherent features of Oilgear "Any-Speed" Drive Systems.

Hammer operator indicated Oilgear-powered Manipulator with 5300-lb ingot.


Manipulator operator indicated. Cut-off of second 9-in. square, 90-in. bloom worked from one ingot.

SOLUTION: An Oilgear Linear Drive and Electrohydraulic Control System as shown above schematically. This departure from customary manipulator drives has proved—*in over two years of operation*—to have the following advantages: **1.** Lower operating costs . . . previous manipulator averaged 12% to 15% downtime every 16-hour day for repair and adjustment of drive and control components. **2.** Direct push and pull linear drive is a more positive, smoother, shockless feed—NOT affected by variations in wheel traction. **3.** Remote console with simple electrohydraulic servo control eliminates operator discomfort and fatigue. **4.** Cylinder is protected below floor—"Power-Pak" is mounted away from heat and dust of work area. **5.** Constant, automatic overload protection insures longer life, prevents damage.

System was selected due to Oilgear's reputation for trouble-free reliability, long life, simplicity, and on-the-job-proved performance of the following *Oilgear-Powered* equipment in this user's plants . . . 300-ton ingot strippers . . . large forming presses . . . tube pointing presses . . . hydrostatic testers . . . stripping presses . . . pipe benders . . . seamless steel tube piercers . . . planers . . . cut-off machines . . . tube threaders—operating efficiently—in constant, daily use—some have been in service for more than 20 years.

User Reports—" . . . well pleased with the steady feed rate at both low and high speeds . . . we'll go to this type of drive when we rebuild or require another Manipulator."

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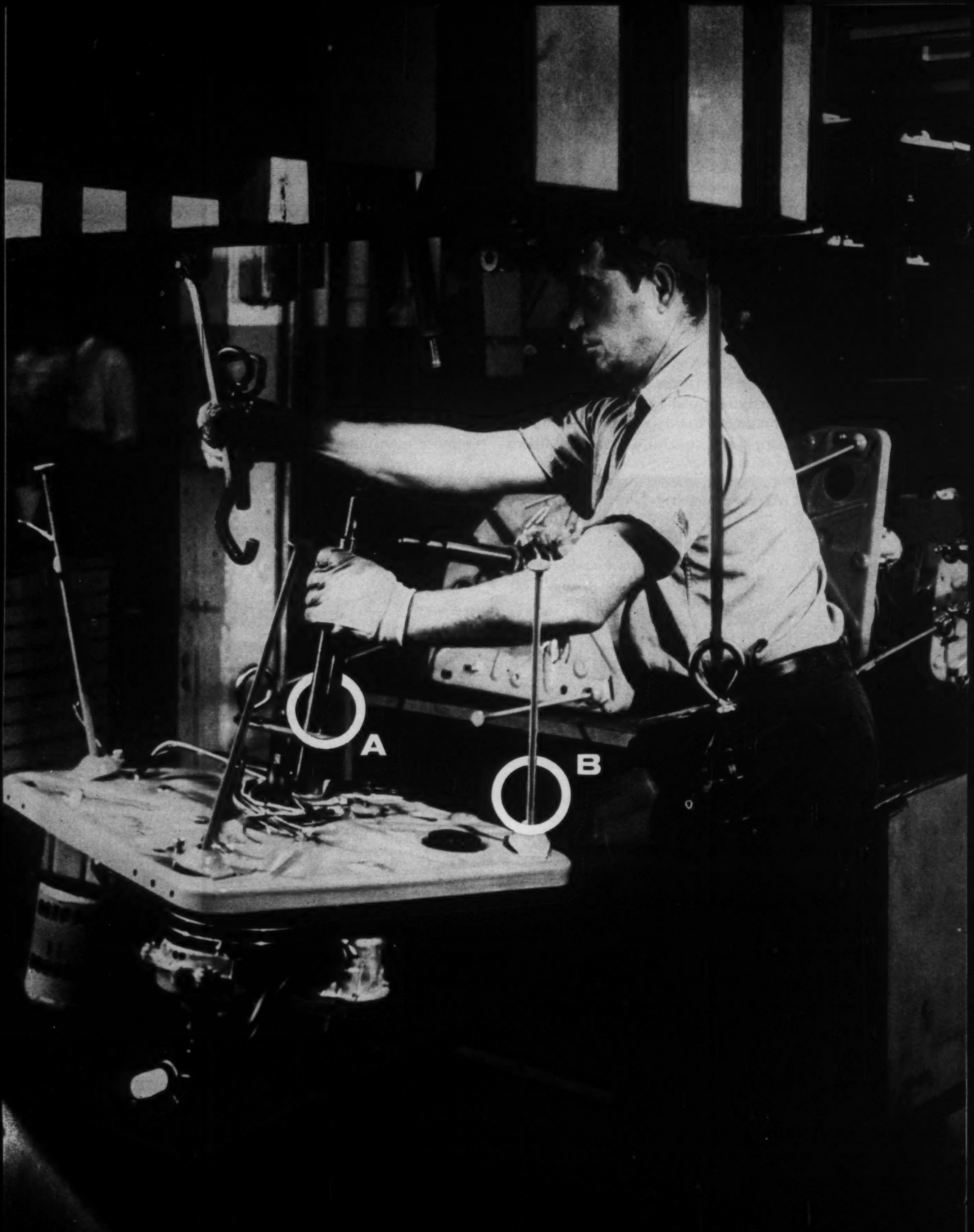

A
B

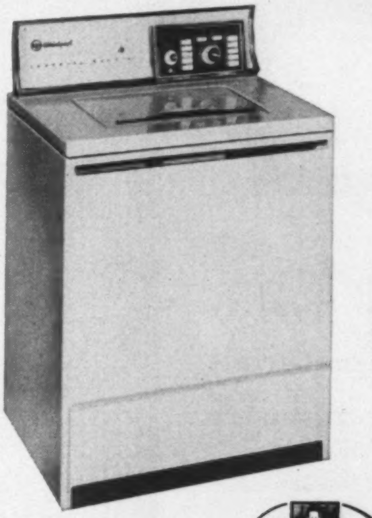
Republic Products form KEY COMPONENTS for RCA Whirlpool WASHING MACHINES

Design a washing machine with 11 automatic cycles . . . build in long-term dependability . . . keep prices competitive. The Whirlpool Corporation does it in their 1961 line of washers. Precision engineering is one part of the story . . . careful selection of materials and components (such as those illustrated here) is the other.

Republic's broad product lines and unique capabilities can help you build more quality into your products, too . . . often at a lower cost than the materials you're presently using. For more specific information, and for data on the Republic design, engineering and metallurgical services available to you, mail the coupon.

A. MECHANICAL TUBING—Washing machine center posts are made from 1¾ O.D. Republic ELECTRUNITE® Mechanical Tubing. Its true concentricity and high uniformity eliminate finishing costs. No rejects or wasted material. Just two simple steps (counter boring and pressing in bushing) and the mechanical tubing component is ready for installation. Mail the coupon for more information on Republic ELECTRUNITE Mechanical Tubing.

B. HOT ROLLED BARS—Suspension rods that carry the weight of the entire operating mechanism and anchor the unit to the washer cabinet, are fabricated from 7/16-inch Hot Rolled Carbon Bars from Republic's new 11-inch mill. Strength and uniform quality are important considerations. Finished rods must have a 3,000 psi tensile strength. The lower ends of the rods are mounted in a rubber grommet to permit limited movement of the machine mechanism without transmitting vibration to the cabinet. Send coupon for more information on Republic Bars.



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Specifically pertaining to:________________Product Line
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Company________________________
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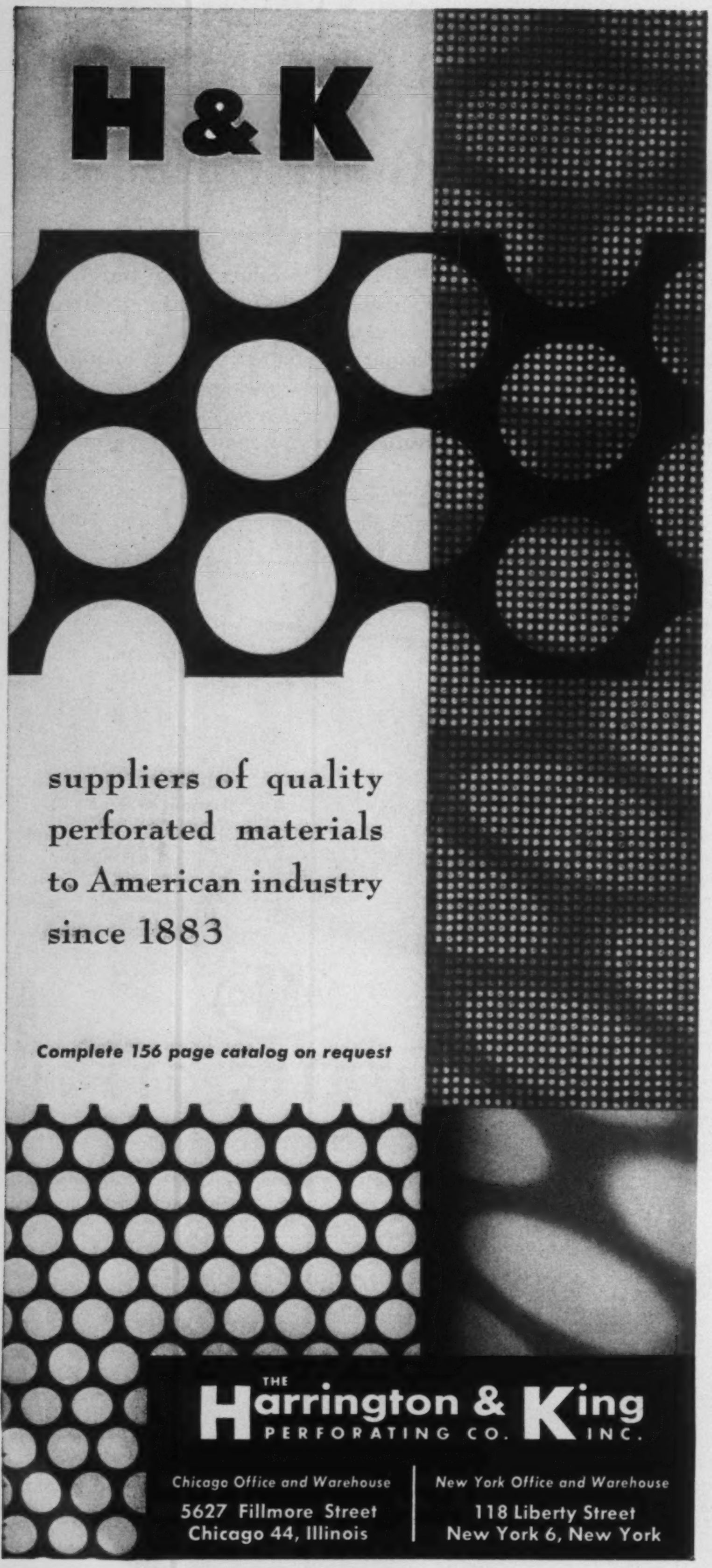

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CALENDAR
OF MEETINGS

Sept. 19-20, Steel Founders' Society of America: Fall meeting, Homestead Hotel, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Sept. 21-23, American Society of Mechanical Engineers and American Institute of Electrical Engineers: Power conference, Bellevue-Stratford Hotel, Philadelphia. Information: ASME, 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Sept. 22-23, National Foundry Association: Annual meeting, Edgewater Beach Hotel, Chicago. Association's address: 53 W. Jackson Blvd., Chicago 4, Ill. Executive secretary: C. T. Sheehan.

Sept. 25-28, American Institute of Chemical Engineers: Fall meeting, Mayo Hotel, Tulsa, Okla. Institute's address: 25 W. 45th St., New York 36, N. Y. Secretary: F. J. Van Antwerpen.

Sept. 25-28, Porcelain Enamel Institute: Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute's address: 1145 19th St. N. W., Washington 6, D. C. Managing director: John C. Oliver.

Sept. 26-29, American Welding Society Inc.: National fall meeting, Penn-Sheraton Hotel, Pittsburgh. Society's address: 33 W. 39th St., New York 18, N. Y. National secretary: Fred L. Plummer.

Sept. 26-30, Instrument Society of America: Instrument-automation conference and exhibit, and annual meeting, Coliseum, New York. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

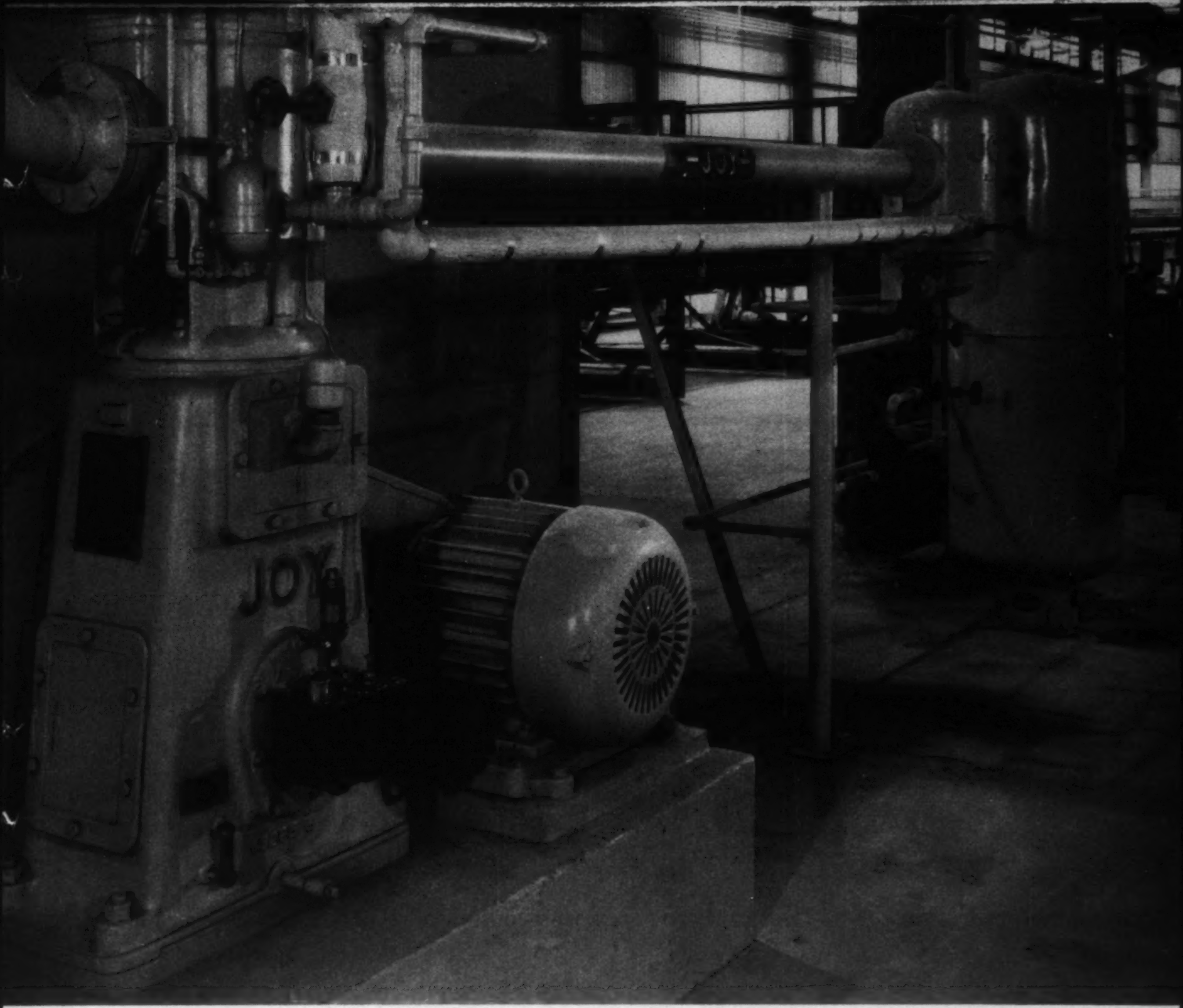
Sept. 27-29, National Screw Machine Products Association: Executive seminar, St. Clair Inn, St. Clair, Mich. Association's address: 2860 E. 130th St., Cleveland 20, Ohio. Executive vice president: Orrin B. Werntz.

Sept. 27-30, Association of Iron & Steel Engineers: Annual meeting and exposition, Public Auditorium, Cleveland. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Oct. 9-13, Electrochemical Society Inc.: Fall meeting, Shamrock Hotel, Houston. Society's address: 1860 Broadway, New York 23, N. Y. Executive secretary: Robert K. Shannon.

Oct. 9-14, American Institute of Electrical Engineers: Fall general meeting, Morrison Hotel, Chicago. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Oct. 10-12, National Electronics Conference Inc.: Annual meeting, Sherman Hotel, Chicago. Conference's address: 228 N. LaSalle St., Room 2104, Chicago, Ill. Executive secretary: R. J. Napolitan.



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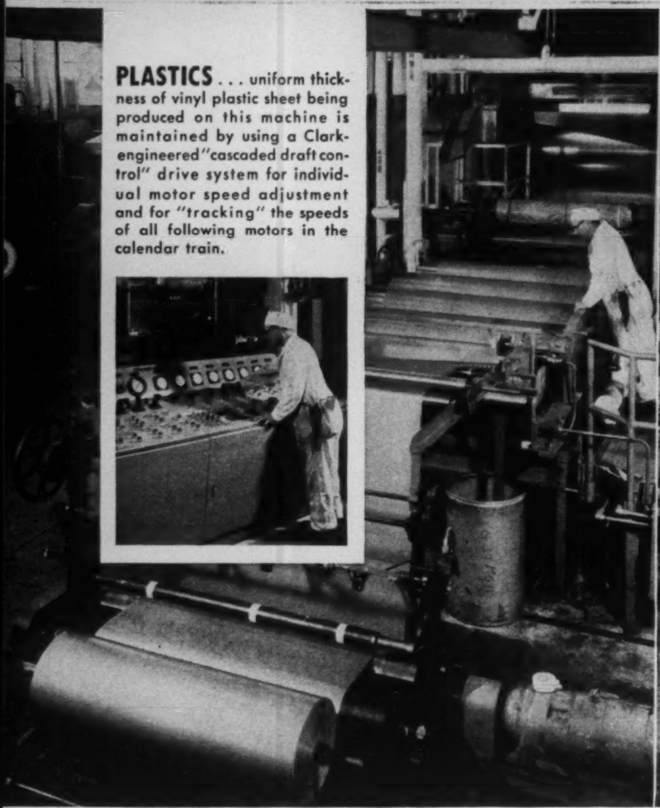

PLASTICS . . . uniform thickness of vinyl plastic sheet being produced on this machine is maintained by using a Clark-engineered "cascaded draft control" drive system for individual motor speed adjustment and for "tracking" the speeds of all following motors in the calendar train.

FOODS . . . automated transfer of bulk sugar from ships to warehouses at rates up to 300 tons per hour is directed by a Clark-engineered and Clark-built control system.

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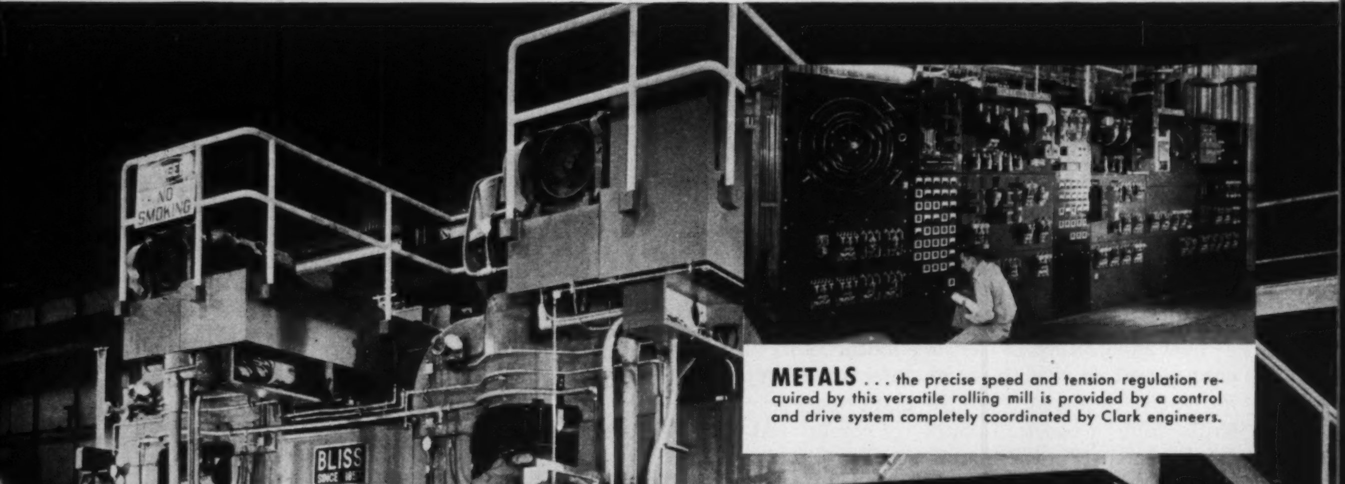

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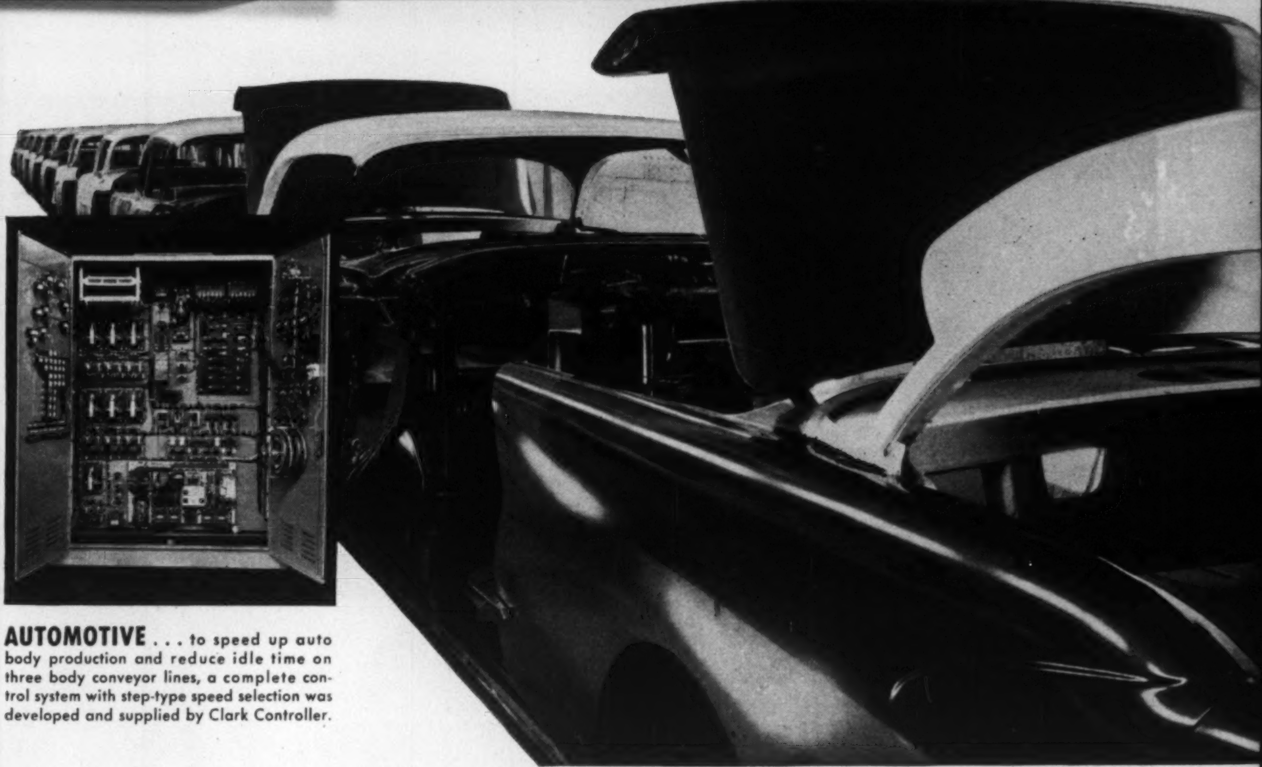

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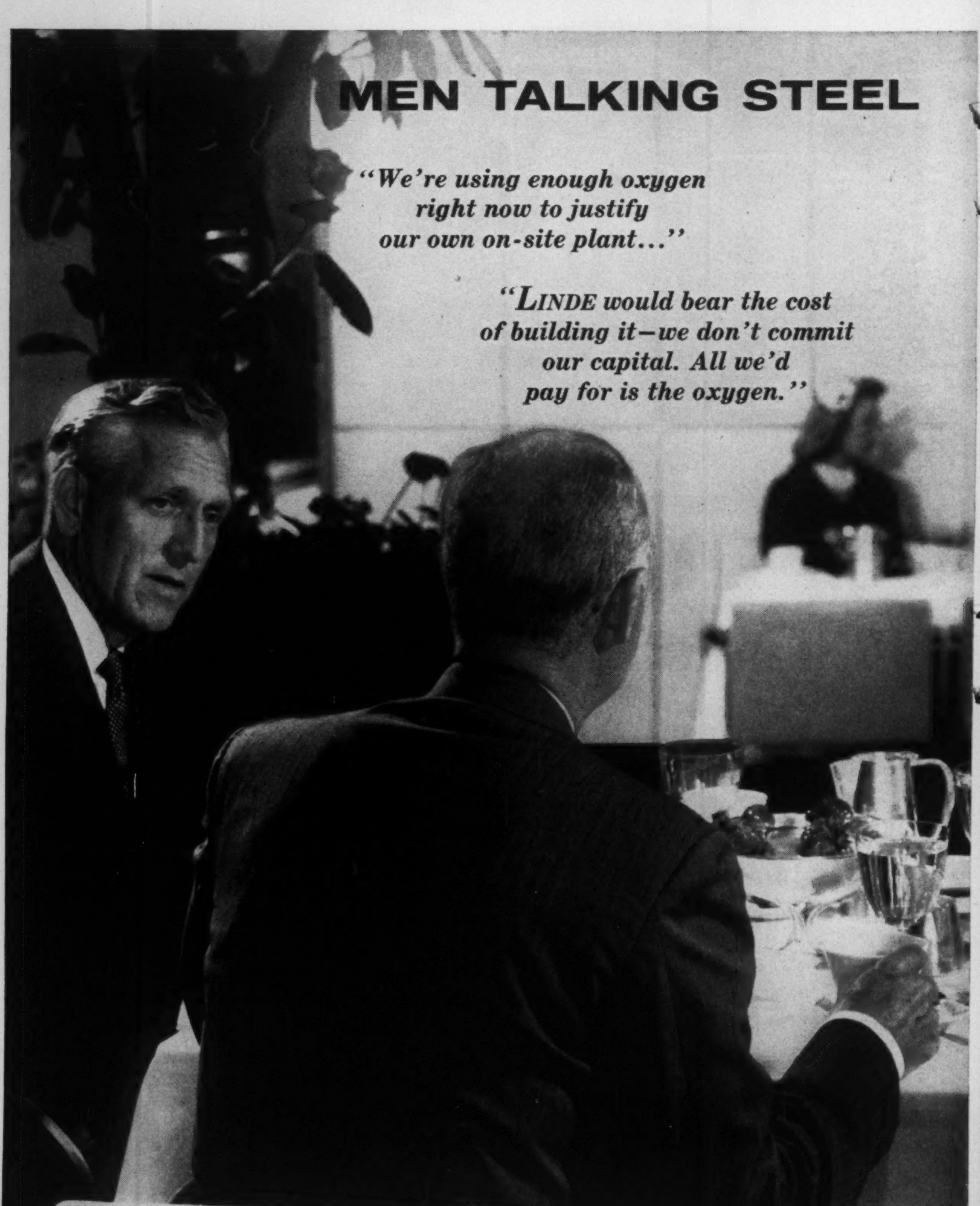

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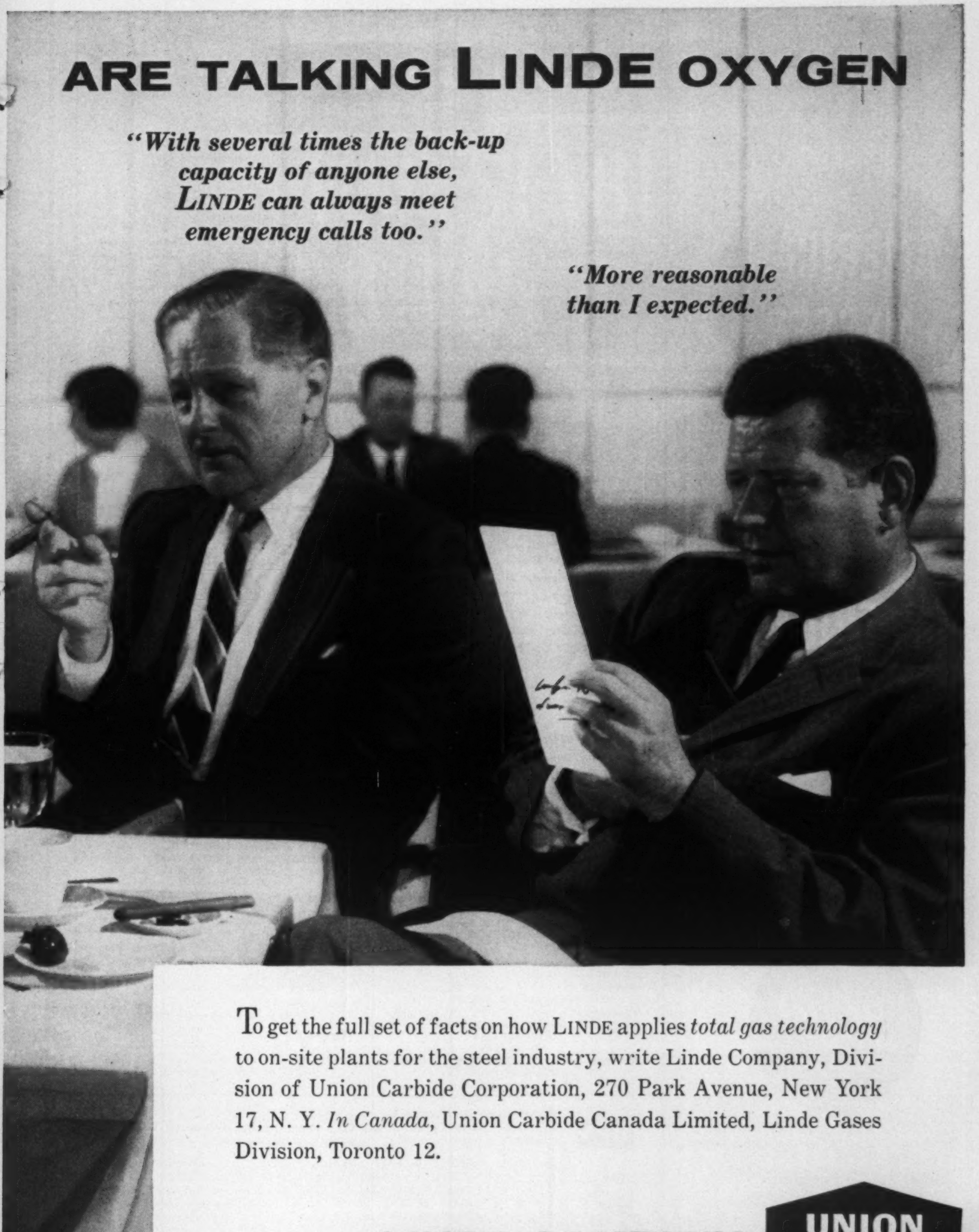
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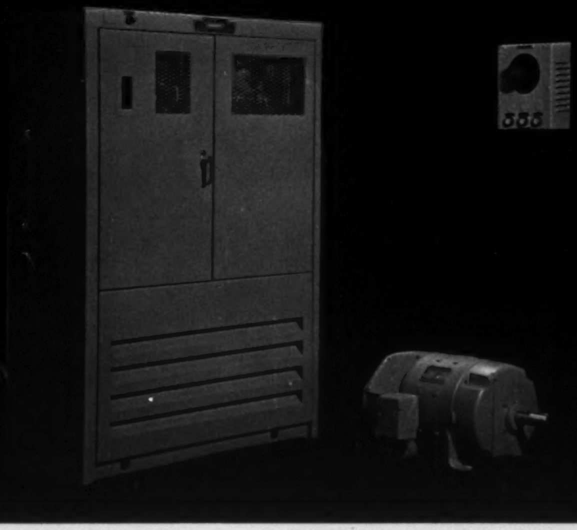

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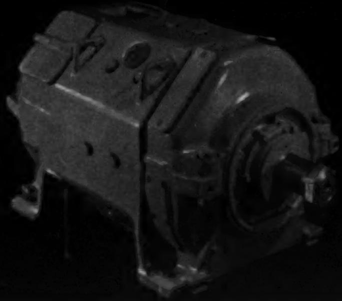

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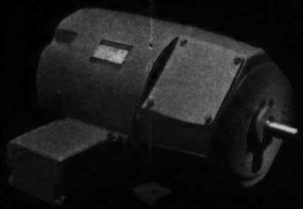

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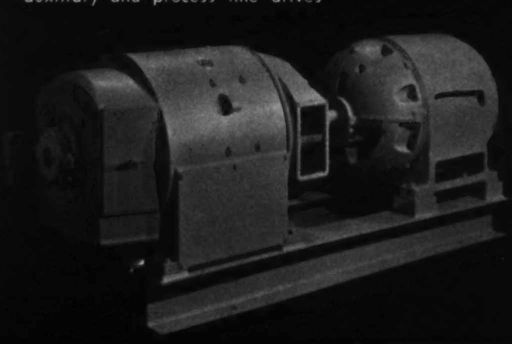

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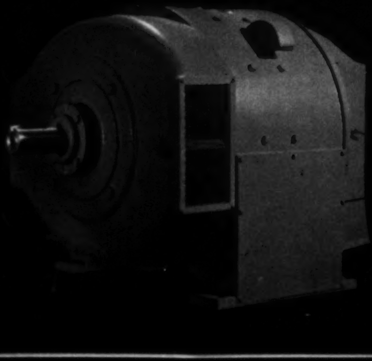

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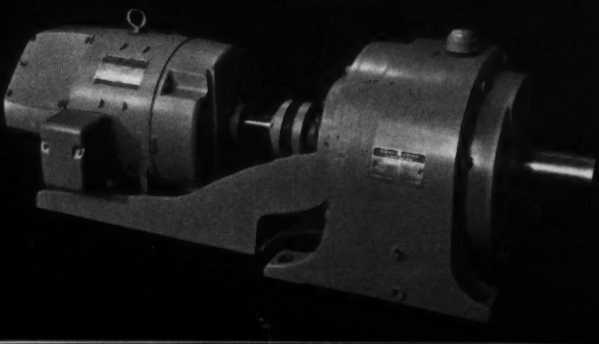

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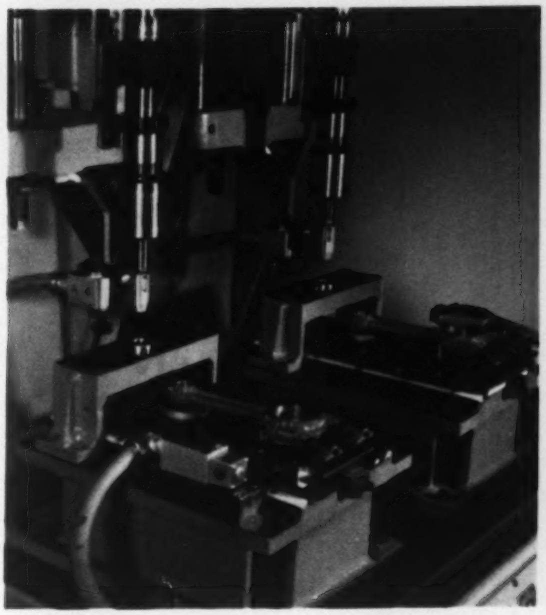

NEW

Natco Heavy Duty Production Honing Machines

Pinion gears, connecting rods, rocker arms, compressor components—Natco/Jes-Cal mechanical honing machines have been developed for better honing of just such parts as these.

These new machines are designed to use production-proven Jes-Cal honing tools with the exclusive, automatic, plug-gage method of size control. Add the sturdiness and tolerance-holding stability of Natco machine design and you know why these are machines to end your production honing problems.

They will hone any bore from ½″ to 3″ in length and up to 3″ in diameter. Rotational speeds of 200 to 800 rpm and reciprocation from 60 to 240 strokes per minute are fixed by pick-off gears. Stroke length up to 3″ is adjustable in desired increments.

Use them singly or as multiple heads on a common base. Integrate them into your transfer line—they are fully compatible with Natco drilling, tapping, boring, and milling machines. For more facts call your Natco or Jes-Cal representative. Write for Bulletin 200.

The National Automatic Tool Company, Inc., Richmond, Indiana NATCO

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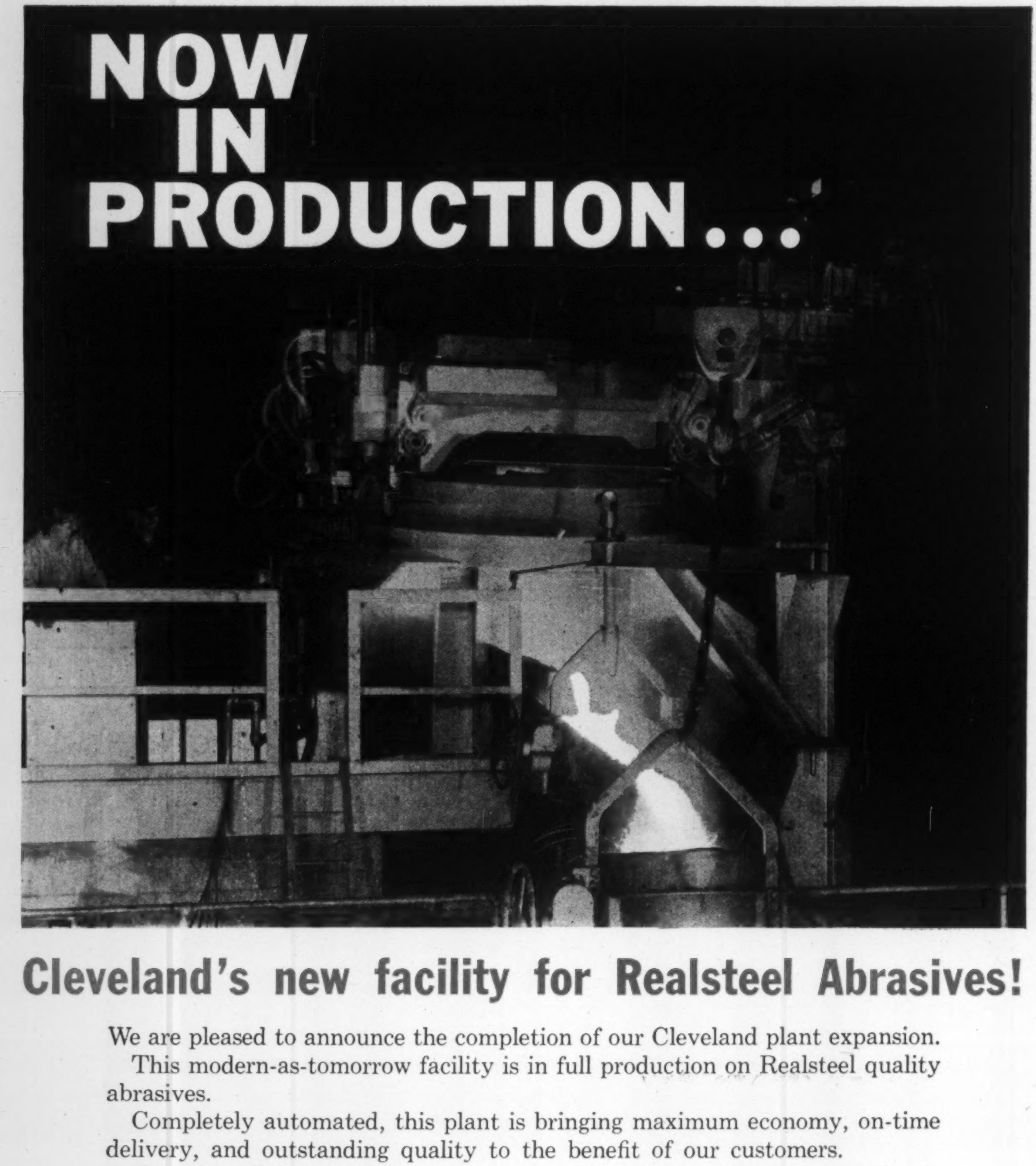

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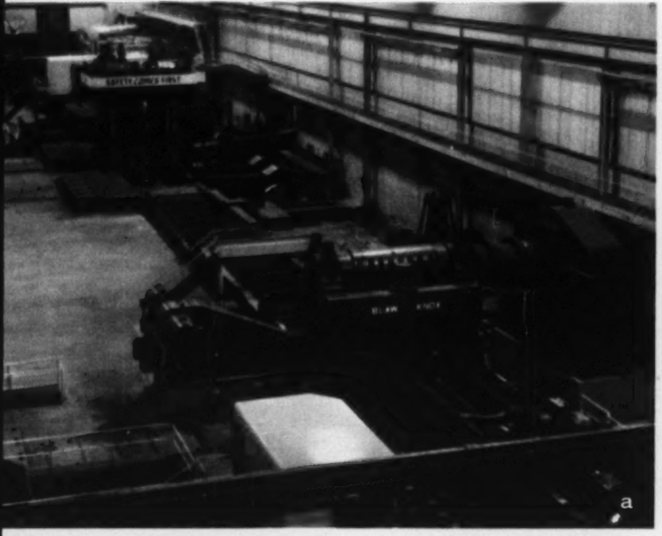

Rolling Mills and Processing Equipment for Shape Rolled Products

a Combination 46- x 114-inch Blooming-Slabbing Mill and 38- x 53- x 114-inch 4-high Plate Mill. **b** Wide Flange Beam and Structural Mill. **c** Merchant Mill.

Rolling Mills and Processing Equipment for Shape Rolled Products (Continued)

d Continuous Butt Weld Pipe Mill. **e** High Speed 2-roll Straightener in Cold Drawn Bar Line. **f** Roller Straightener for Hot Rolled Angles.

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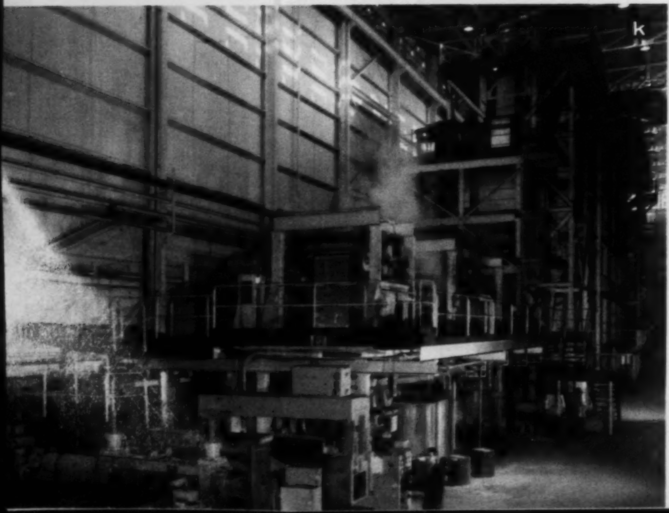

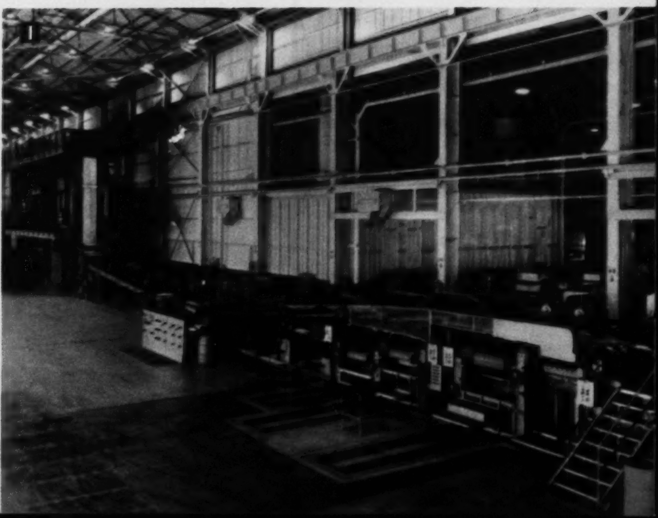

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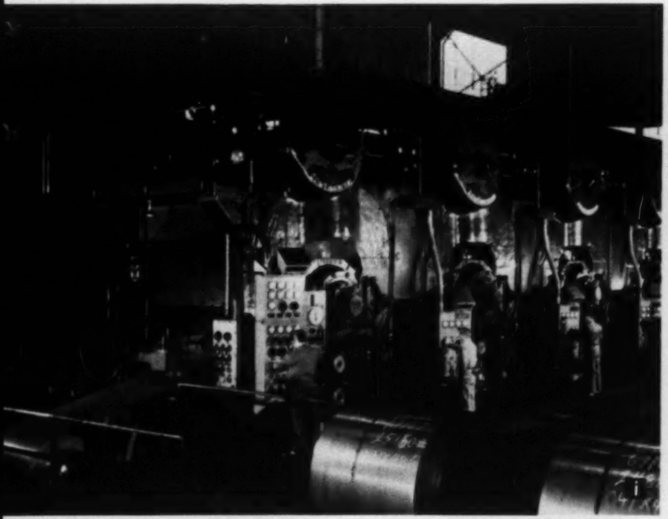
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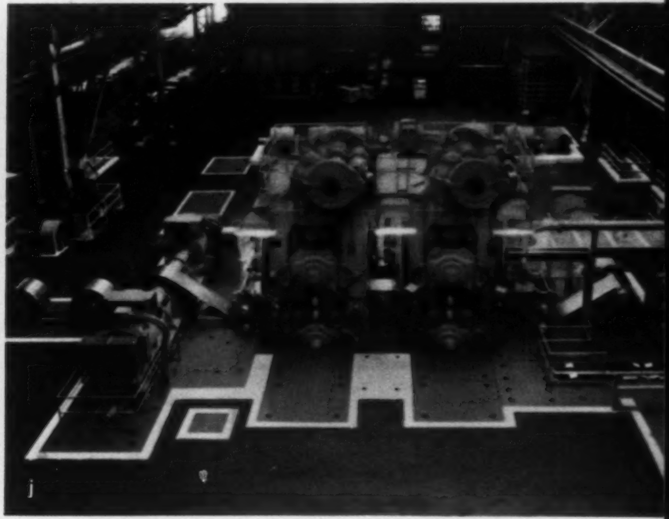
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m

Rolling Mills and Processing Lines for Flat Rolled Products

g 46- x 90-inch Universal Slabbing Mill. **h** 56-inch Hot Strip Mill. **i** 60-inch Tandem Cold Strip Mill. **j** 19- and 53-inch x 48-inch Twin Temper Mill. **k** Continuous Annealing Line. **l** Electrolytic Tinning Line. **m** Continuous Galvanizing Line.

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o Foundry Products: Peels, Slag Pots, Charging Boxes, Ingot and Charging Cars, Ladles, Trunnions and Rings, Blast Furnace Hoppers and Bells.

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q Steel Plant Equipment: Ladle Additions Feeders, Autopours,® Dolomite Machines, Water-cooled Doors, Frames, and Reversing Valves.

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Versatility
Capacity
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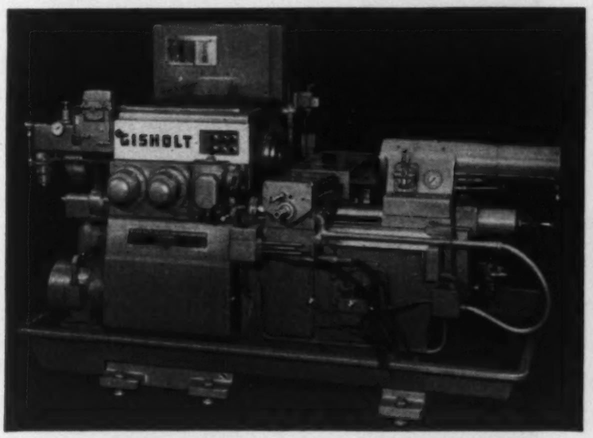

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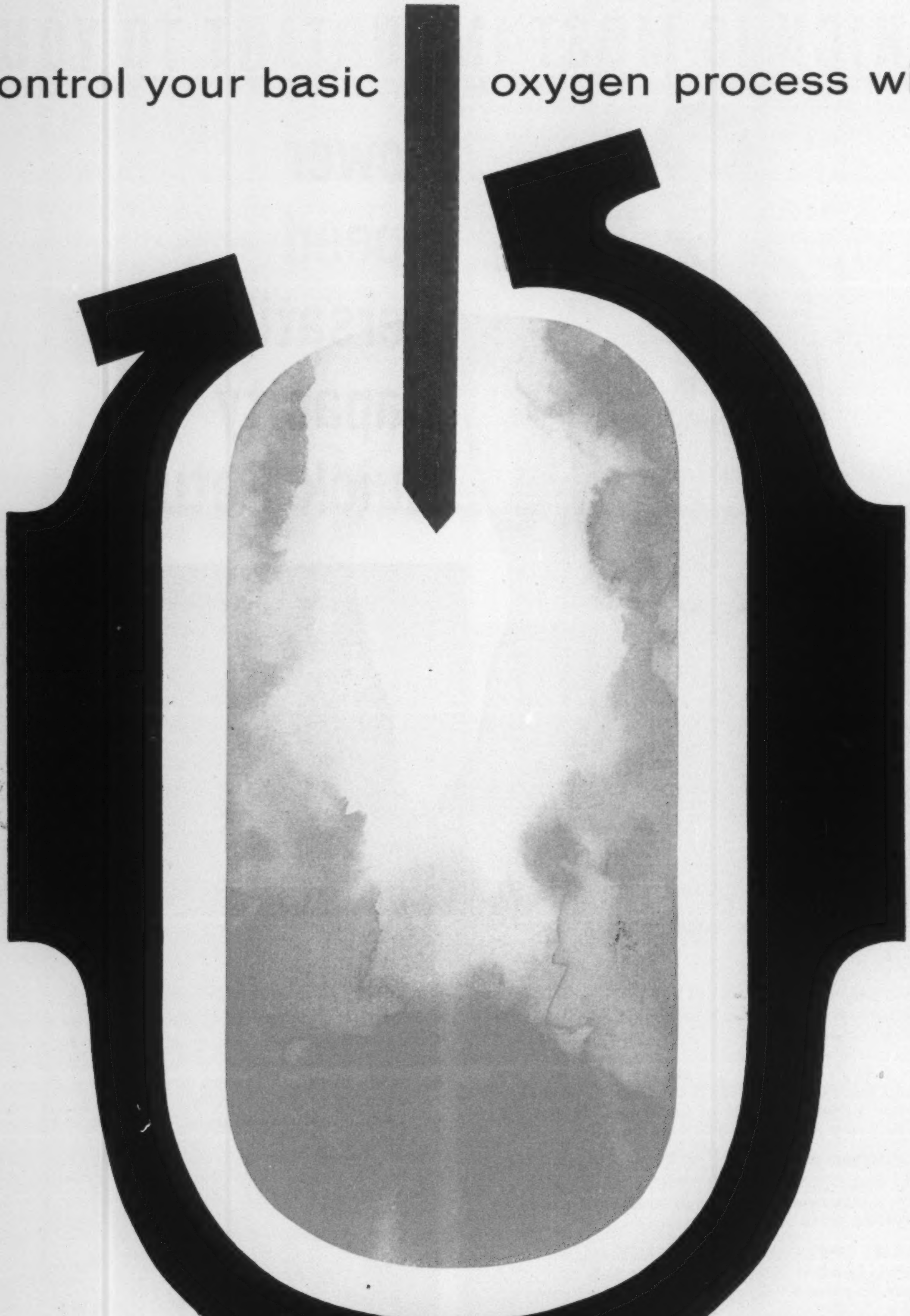
Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Machines • *Factory-Rebuilt Machines with New Machine Guarantee*

Control your basic oxygen process with



a Honeywell instrumentation system

The new basic oxygen process for steelmaking requires fast, precise, integrated control of all variables—oxygen pressure and flow in particular. Honeywell gives you a *complete system* of instrumentation—from primary elements to computer—tailored to the process and to the individual needs of your mill. This system brings extra advantages to the oxygen process.

Honeywell's application engineers will help you choose the proper components for your process from the broad line of Honeywell products—products proved throughout industry. Honeywell instruments, with electric or pneumatic control, are available for all parts of the oxygen process operation.

The Honeywell all-electric oxygen flow computer measures, records, and controls oxygen mass flow rate—automatically and continuously totalizing the oxygen used for all heats in all converters. The computer compensates automatically for temperature and pressure variations—and delivers the exact number of pounds of oxygen the charge requires.

The Honeywell instrumentation system holds temperature, pressure, humidity, and electrical power at optimum levels at every step of the process—protecting all the equipment—process vessel linings, exhaust gas hood, ducts, and precipitator.

Custom-designed Honeywell systems for the basic oxygen process are now performing in major steel mills across the country. The mills gain Honeywell's unique experience in controlling the oxygen process as well as the assurance of reliable, single-source responsibility for the entire system. Your nearby Honeywell field engineer can give you complete details. Call him today . . . he's as near as your phone.

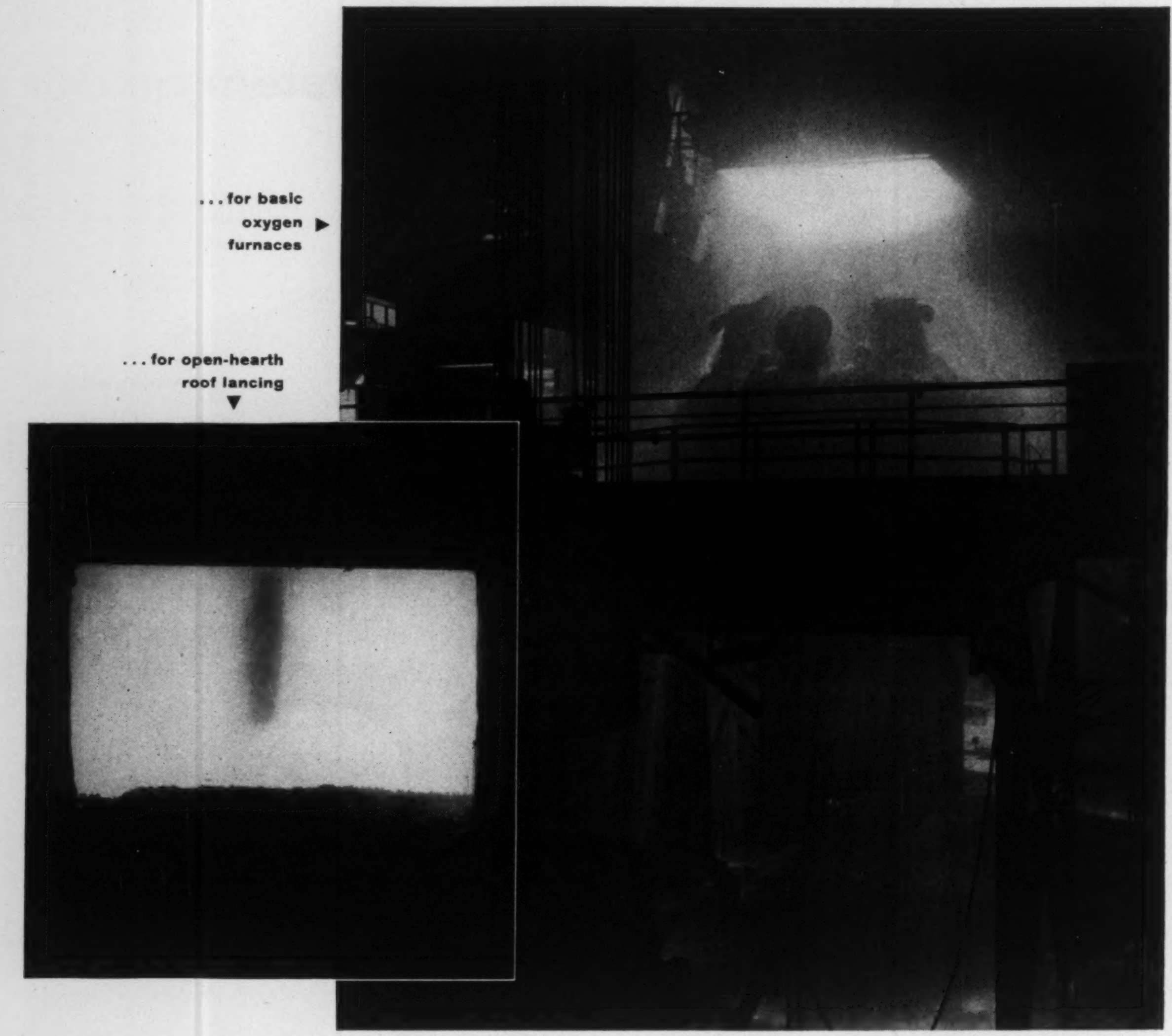
MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Penna. In Canada, Honeywell Controls, Ltd., Toronto 17, Ont.

75th YEAR PIONEERING THE FUTURE

Honeywell

First in Control

H HONEYWELL SINCE 1885


. . . for basic oxygen furnaces
. . . for open-hearth roof lancing

AGAIN! Jones & Laughlin calls on Air Products for reliable, low-cost oxygen

Two new Air Products on-site plants will soon supply Jones & Laughlin Steel Corporation with an added 840 tons per day of high purity oxygen. At the company's Cleveland Works, a 500 tons per day plant will serve basic oxygen furnaces—a process already in use by J & L at its Aliquippa Works, where a 230 tons per day Air Products plant has been supplying oxygen for over three years. At the Pittsburgh Works, a new 340 tons per day plant will supplement an existing 100 tons per day plant to enable J & L to fully convert open hearths to the oxygen roof lancing technique. Both plants will be built, owned and operated by Air Products.

As in the past, Air Products is building reliability of on-site supply into the plants at both locations, in that oxygen will be produced in gaseous and liquid forms. The liquid oxygen is stored in specially-designed tanks for use during shut-down or high consumption periods, reducing dependence on hauled-in supply. If experimental steel-making techniques increase oxygen demands beyond on-site capabilities—as in the case of Aliquippa—Air Products can offer supplemental oxygen on a hauled-in basis during such periods.

Steelmakers across the country are taking advantage of over twenty years of Air Products experience with on-site oxygen . . . plus continuous application research by our technical service department. Write or call for a down-to-earth discussion of your requirements. Air Products, Inc., Allentown, Pa. Phone EX 5-3311.

Air Products
...INCORPORATED

SPIROPOINT*

makes twist drills produce at Breeze Corporations, Inc.

says Works Manager Harold Schwartz

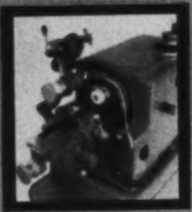
"...50% greater drill life"

"...up to 40% saving in drilling time"

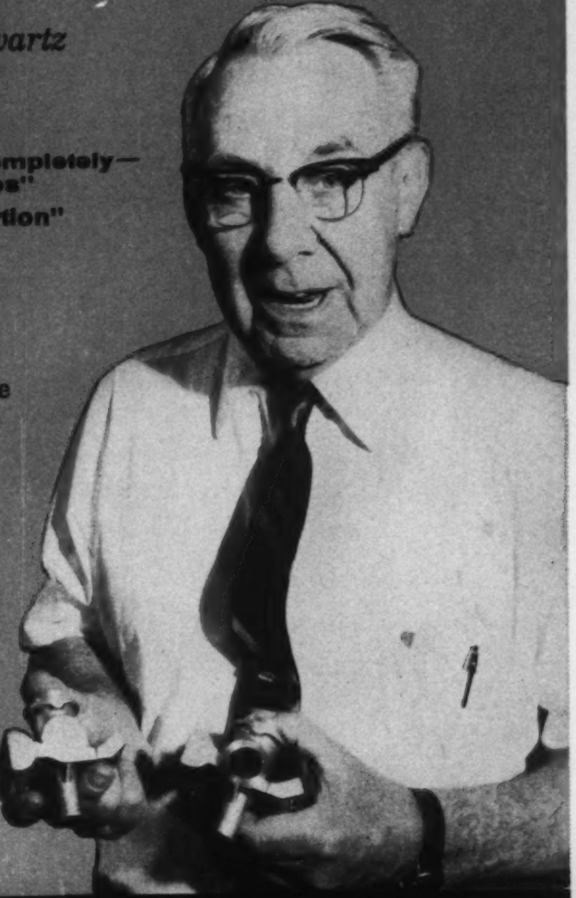
"...centering operations eliminated completely—reaming unnecessary on many jobs"

"...70% reduction in workpiece distortion"

Breeze Corporations, Inc. of Union, New Jersey, executes complete design and production of precision electrical, electro-mechanical, and hydro-mechanical components and systems. Drilling costs have been cut at Breeze because, with spiral points, all holes are "right on center, round, smooth, and right to size—*at both ends!*", Mr. Schwartz stated.



*** Cincinnati SPIROPOINT® Drill Sharpener applies the new spiral point geometry to standard twist drills in a matter of seconds.**



Works Manager Schwartz holds "Guillotine" safety device used on helicopter hoists. Production drilled holes 1½" deep are held to .001" tolerance on straightness.

Aluminum slip ring housing 3′ in diameter has 576 holes. The ¾″ holes are drilled through ¾″ metal with spiral point drills in one-third the time normally required. Change in shape of the relatively fragile casting was negligible.

¾″ drilling of this missile control launcher part is held to .001″ tolerances on hole location and diameter—center drilling and reaming operations eliminated.

CINCINNATI LATHE AND TOOL CO.
Cincinnati 9, Ohio
HYDRASHIFT Lathes • CINCINNATI Drilling Machines • SPIROPOINT Drill Sharpeners

Initial Price...
Owning Cost?
Know both to keep your steel costs low

You know steel is low in cost. How can you *keep* it that way? One way is never to forget that there's more to *final* cost than initial price. Hidden—and unnecessary—costs of possession, like handling, storing, cutting, taxes and insurance often creep in. Recognize these added expenses.

Each steel user's case is different. Your steel service center will be glad to help you determine the most economical way to buy steel. Figure all your costs of possession, such as:

Cost of capital:
- Inventory
- Space
- Equipment

Cost of operation:
- Space
- Materials handling
- Cutting & burning
- Scrap & wastage

Other costs:
- Obsolescence
- Insurance
- Taxes
- Accounting

Call your nearby steel service center, or write for free booklet, "What's Your Real Cost of Possession for Steel?"

STEEL SERVICE CENTER INSTITUTE

. . . YOUR STEEL SERVICE CENTER

STEEL SERVICE CENTER INSTITUTE
540-A Terminal Tower, Cleveland 13, Ohio

Steel

CONTROL

SEE US
AT THE
Iron & Steel
EXPOSITION
SEPT. 27, 28, 29, 30
CLEVELAND, OHIO
Booth 410

ELECTROHYDRAULIC ARC FURNACE CONTROL

SHORTER MELT TIME

. . . for higher yields. Electrode speeds up to 30 ft./min. with safety and stability. Less time to bring electrode down to scrap at start; less time to recover arc after scrap falls away. Rapid short circuit elimination. Less electrode breakage through rapid pull-away on scrap cave-ins.

INITIAL COST REDUCED

. . . as much as 50%. Many components necessary for electric system are eliminated. Extremely simple electrohydraulic system uses a minimum of starters, contactors, rectifier systems, etc.

MINIMUM MAINTENANCE

. . . because hydraulic cylinders eliminate cable changes, gear train maintenance or replacement. No routine maintenance of control panel.

PERFORMANCE GUARANTEE

. . . from the supplier of the most reliable controls to the steel industry for a quarter of a century.

PROVED SUPERIORITY

. . . through the experience of leaders in high-quality steels and specialty metals, who are successfully meeting competition with GPE electrohydraulically controlled arc furnaces. Your GPE Controls representative has list of installations.

Write for descriptive literature

GPE Controls

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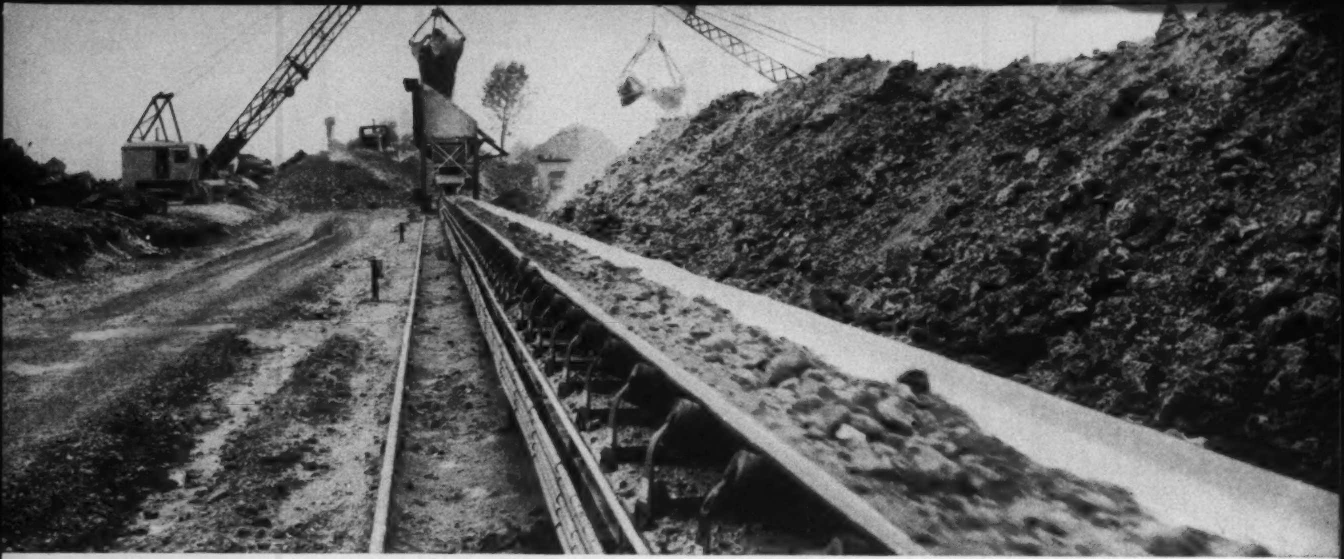
GENERAL
PRECISION
COMPANY

GPE Controls, Inc.
240 E. Ontario Street • Chicago 11, Illinois

A Subsidiary of GENERAL PRECISION EQUIPMENT CORPORATION

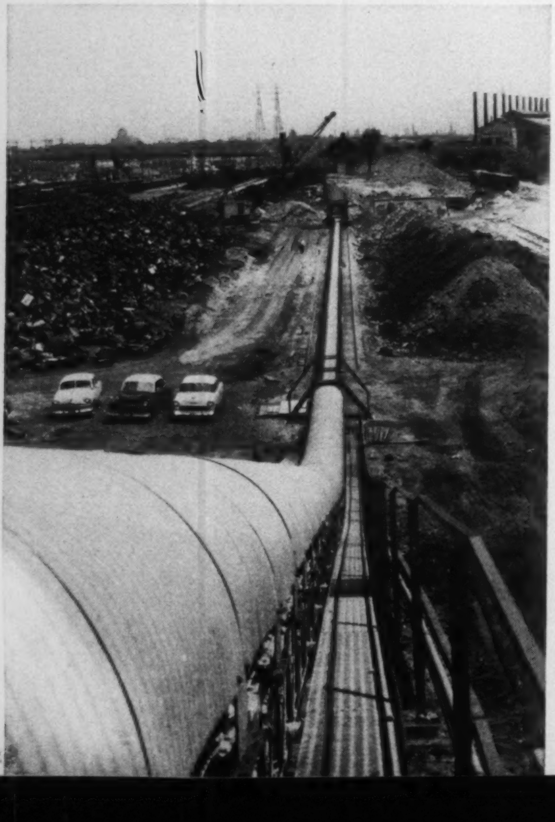


Unique slag handling conveyor system utilizes 334 Barber-Greene ball bearing idlers, not one of which has yet been replaced. Photo shows slag being reclaimed from stockpile and loaded into travelling hopper-feeder.

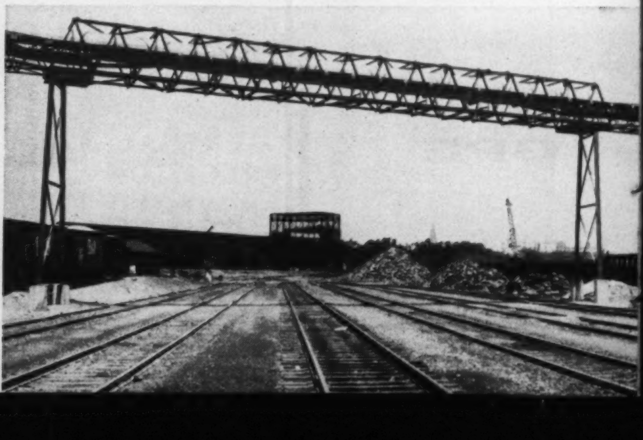
"MOVING SIZZLING SLAG OVER BELTS

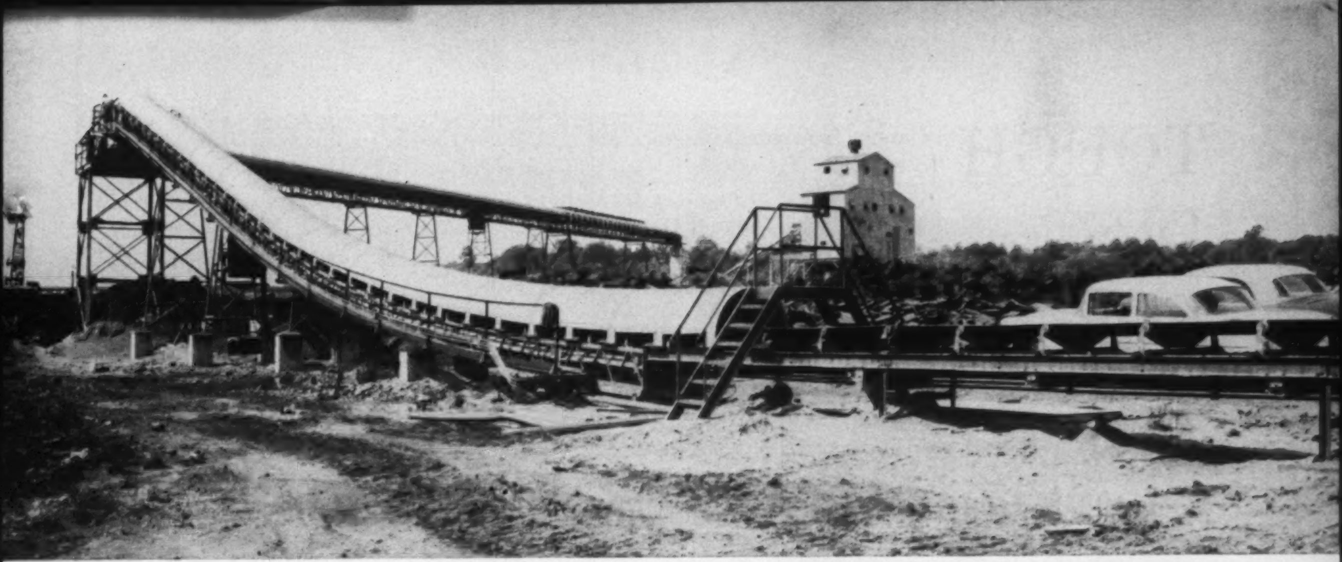
Slag is dumped from ladle cars at 2000°F., sprayed with water, and cooled five days before being transferred to stockpile by clamshell.

Entire 924′ two-unit slag handling system was engineered, fabricated, and erected by Barber-Greene, assuring the customer of undivided responsibility for satisfactory performance.



Standard Barber-Greene gallery truss is used to span six railroad tracks in one hop. Remaining tracks are spanned by standard 42″ deep truss.





Inclined conveyor utilizes standard Barber-Greene 6″ channel frame at tail end for most efficient loading height and 24″ heavy-duty truss on incline to give longer spans between supports.

CUTS HAULAGE COST AT LEAST 40%"

"Our Barber-Greene belt conveyors have performed wonderfully, handling up to 28,000 tons monthly," reports W. R. Moore, Jr., Cleveland Slag official

Lowest cost and most dependable haulage are dual benefits the Cleveland Slag Division of Standard Slag Co. gets with its heavy-duty two-unit 924′ long Barber-Greene belt conveyor system that moves slag from stockpile to the crushing plant of this Cleveland aggregate producer.

W. R. Moore, Jr., assistant general manager, relates, "Our Barber-Greene system has performed wonderfully in handling up to 28,000 tons of 200-300°F. slag monthly since installation in 1957. Initially, the conveyors cost about the same as trucks, which were also under consideration. However, our studies have shown that the belts cut haulage cost at least 40% over what it would have been with trucks."

Flow Pattern—Molten slag is received here in ladle cars from nearby Jones & Laughlin furnaces and dumped into cooling pits, where it is sprayed with water before being moved by clamshell to the stockpile alongside the conveyor. A second clamshell then loads the slag into a mobile hopper-feeder mounted over the 556′ long inclined conveyor.

Atop the incline, the slag is transferred to a 365′ long conveyor that speeds it across the railroad tracks and into the crushing plant, where it is reduced to lightweight building aggregates.

Hopper-Feeder Moves 407′—One of the unique design features of this installation is the Barber-Greene self-propelled hopper-feeder that straddles the horizontal portion of the inclined conveyor. Its 407′ travel length permits building of a long stockpile beside the conveyor that can be easily reclaimed with minimum crane movement.

The same engineering skill that solved this tough problem for Cleveland Slag is ready to go to work for you. Your Barber-Greene conveyor specialist will gladly explain how standardized components, specially engineered components, or a combination of both can bring increased efficiency and lower costs to your job.

Barber-Greene hopper-feeder, designed especially for this job, travels 407′ along stockpile under own power.

Your belt conveyor equipment headquarters

Representatives in Principal Cities of the World

Barber-Greene BG

Main Office and Plant AURORA, ILLINOIS, U. S. A.
Plants in DeKalb, Illinois..Detroit..Canada..England..Brazil..Australia

CONVEYORS • LOADERS • DITCHERS

ASPHALT PAVING EQUIPMENT

TOUGH DIET FOR TIN PLATE

Canned fruit salads may be easy on fashion-trim figures but they're murder on containers. To withstand biting food acids, the tin plate must be securely bonded to the steel . . . a trick that calls for thorough cleaning of the steel before plating. One of the latest Pennsalt cleaners does the job in superior fashion. In fact, nine out of ten cans produced today get their start with Pennsalt tin mill cleaners.

The first job-engineered tin mill cleaners were pioneered by Pennsalt some 23 years ago. Pennsalt has maintained its leadership by keeping pace with changes in plating, rolling and annealing techniques . . . and today offers a complete line of cleaners to meet modern tin mill requirements. The same chemical ingenuity and application experience are key ingredients in the broad line of chemicals and equipment which Pennsalt supplies to the metalworking industry. Write or call us for a consultation on your own finishing problem.

. . . a better start for your finish®

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Pennsalt Chemicals®
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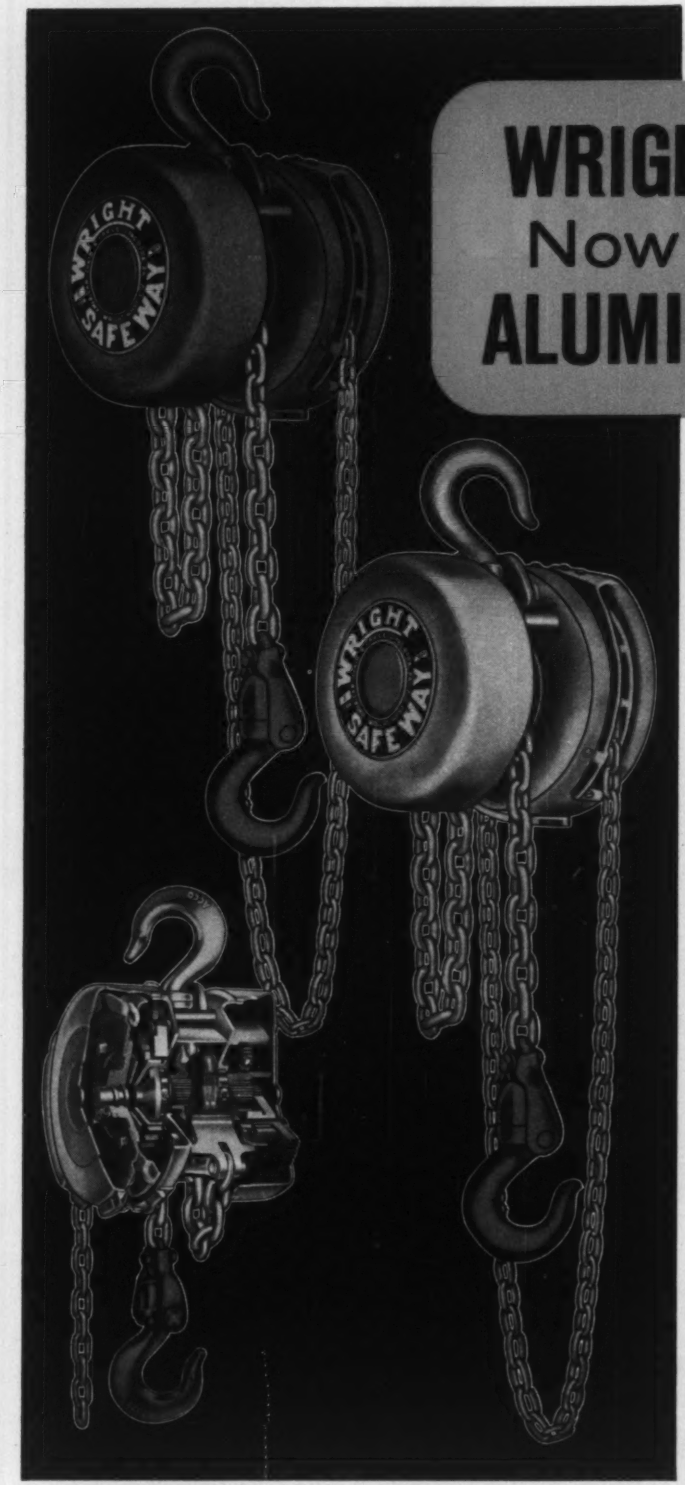


WRIGHT SAFEWAYS
Now Available in
ALUMINUM or STEEL

• Take the finest hand hoist ever made for simplicity of design and sturdiness of construction...add to it new external and internal parts of aluminum...and you have the WRIGHT Aluminum Safeway Hand Hoist. This hoist is made lighter and more easily portable, yet retains all the advantages of the original Safeway design. It features load-bearing parts of strong, shock-resistant steel. Aluminum replaces the heavy steel covers, chain guide and hand chain.

It is a self-lubricating hoist which keeps load chain, load wheel and gear train operating smoothly at all times. Gear train is enclosed in grease-tight chamber and stays lubricated for life. Load chain and load wheel are lubricated by wick-type oiler fed from refillable reservoir.

Two factory tests certify the accuracy, workmanship and rated load-carrying capacities of these new aluminum hoists. Every foot of load chain is proof-tested and every completed hoist is tested at 50% above rated capacity.

Available now in six models in a capacity range of ½ to 4 tons, WRIGHT Aluminum Safeway Hand Hoists offer these outstanding features:

GEAR TRAIN • Planetary system using modified involute stub tooth gear form with all gear teeth generated from solid steel blanks.

LOAD BRAKE • Weston type with uniform composition lining and silent pawl.

LOAD WHEEL • Ferrous alloy, reversible, with accurately formed pockets.

LOAD CHAIN • Electrically welded, has maximum wear resistance and ability to withstand extreme impact.

LOAD CHAIN GUIDE • Guides chain into load wheel and shrouds load sheave, protecting parts from falling dust.

BOTTOM HOOK • Nickel-chrome-molybdenum alloy steel. Rocks and swivels. Operates on a Timken thrust bearing.

Contact Your
WRIGHT DISTRIBUTOR

Or write our York, Pa., office for **DH-164** and **DH-345** which give complete information about WRIGHT Safeway Hand Hoists made from aluminum and steel. Find out the advantages they offer you.

WRIGHT HOISTS

ACCO

Wright Hoist Division • American Chain & Cable Company, Inc.

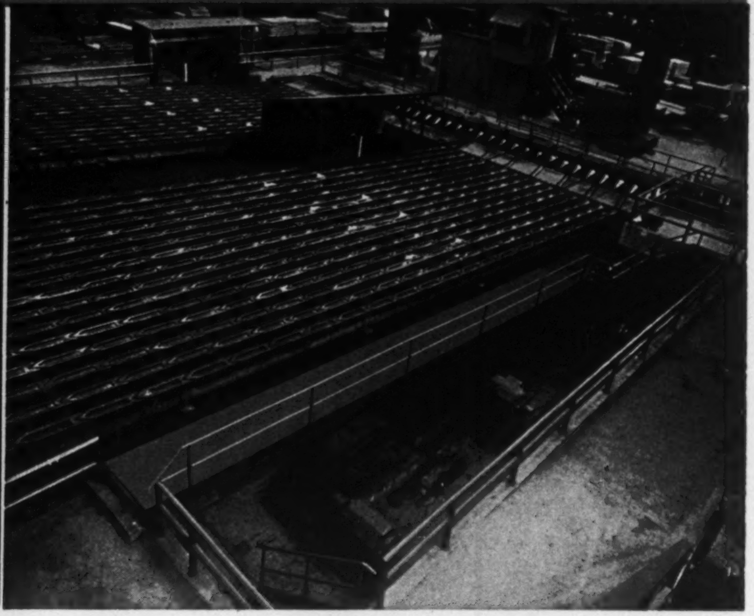
York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York,
Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

TREADWELL COOLING BED

built in tandem, each over 100 ft. long. Each bed will cool 125 tons of 4" x 4" steel per hour.

For heavy duty and efficient production, this steel company called on Treadwell Engineers. The result . . . these Treadwell Cooling Beds are efficiently operating day in and day out.

If you have a machinery problem, call on Treadwell Engineers.



Pictured above: Treadwell Cooling Beds at work in an eastern steel mill.

TEco

TREADWELL

ENGINEERING COMPANY • EASTON, PA.

SALES AND ENGINEERING OFFICES:

208 S. LA SALLE STREET
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CEntral 6-9784

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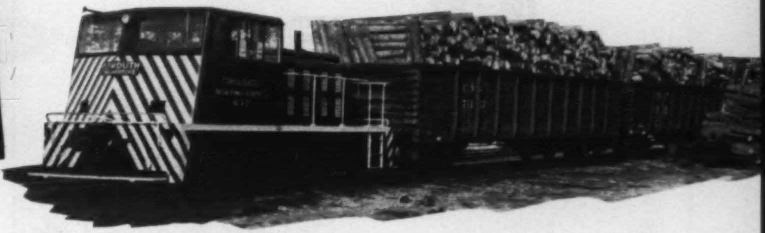
Manipulators, Mill, etc.
Mills, Billet, Merchant & Bar
Mills, Rod
Special Machinery
Coilers & Reels
Conveyors, Coil
Drives & Pinions
Ejectors, Furnace
Gauges, Shear, Saw, etc.
Beds, Cooling,
Mills, Vertical Edging
Tables, Mill
Tables, Tilting & Lift
Tables, Transfer
Transfers
Beds, Inspection
Bumpers, Furnace
Pushers, Furnace
Repeaters
Handling Equipment (Kick-offs, Pilers, Cradles, etc.)

CASTINGS—Electric Furnace Steel, Ductile Iron, Gray Iron and Ni-Hard

PLYMOUTH® LOCOMOTIVES
with Torqomotive Drive
3 TO 80 TONS

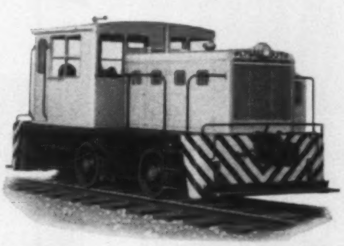
Industry's Smoothest Switchers



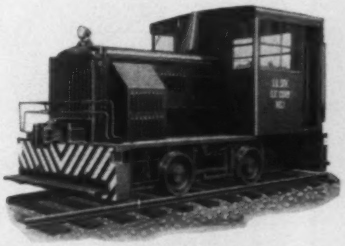
Here's the lineup of well-known Plymouth power in models from 3 to 80 tons . . . narrow or standard gauge . . . Gasoline or Diesel . . . mechanical or Torqomotive Drive . . . Diesel-Electrics. Records of users show Plymouth's economy, efficiency, dependability. Find out how these profit characteristics can improve your operation and cut costs.

PLYMOUTH LOCOMOTIVE WORKS
Division of The Fate-Root-Heath Company
Dept. A-1, **Plymouth, Ohio**

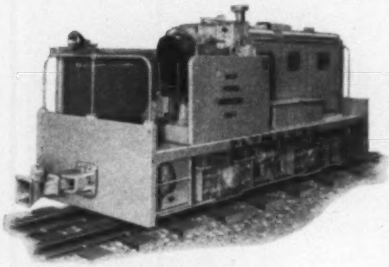
SINCE 1914 Plymouth Locomotives have been used for heavy hauling and switching jobs. They have proven themselves in year after year service with rock bottom economy, maximum availability, minimum down time. Pictured above is the new WDT Cab-in-front model, 40 tons, in service hauling pulpwood. Both the MDT and WDT are available in this model or in the standard models shown below.



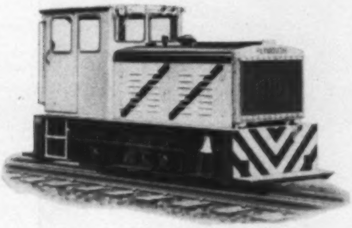
M SERIES, 25, 30, 35 or 40 tons, Diesel or gasoline, mechanical or Torqomotive Drive. This is the standard model, rear cab.



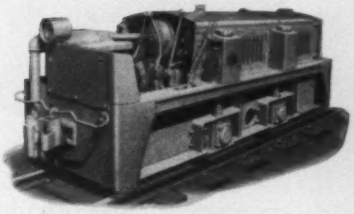
J SERIES, 12, 14, 16, 18 or 20 tons, Diesel or gasoline, mechanical or Torqomotive Drive. Available on 4 or 6 wheels.



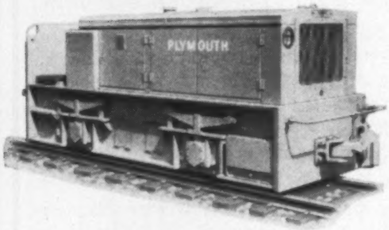
J SERIES Mine-O-Motive, 15 to 25 tons. Diesel powered with exhaust conditioner, Torqomotive Drive. Approved under Schedule #24.



D SERIES, 8, 10 or 12 tons, Diesel or gasoline, mechanical or Torqomotive Drive. Cast or Welded Frame.

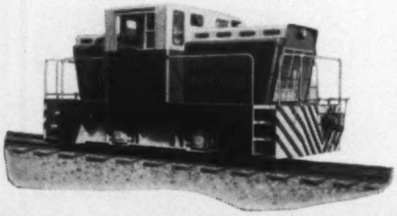


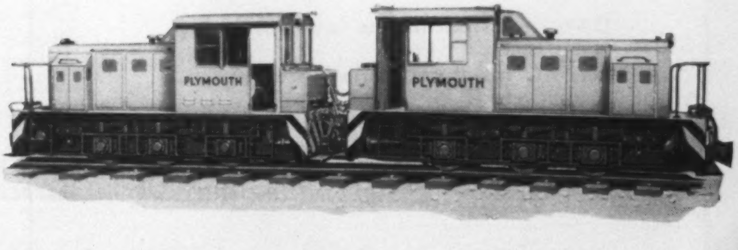
F SERIES, 5, 6, or 7 tons, available as mine type (illustrated) or cab type. Torqomotive Drive, short wheelbase.



DMS SERIES Mine-O-Motive, 8, 10 or 12 tons. Diesel powered with shaft drive to both axles, full power shifting. Approved under Schedule #24.

CR SERIES, 40 to 60 tons. Diesel powered with shaft drive to both axles, full power shifting, Torqomotive Drive. Speeds to 35 MPH.





PLYMOUTH TANDEMS—M or W Series 50 to 80 tons. The M or W Series can be built for tandem, single control operation, up to 80 tons on either 8 or 12 wheels. Each locomotive can also be operated individually.

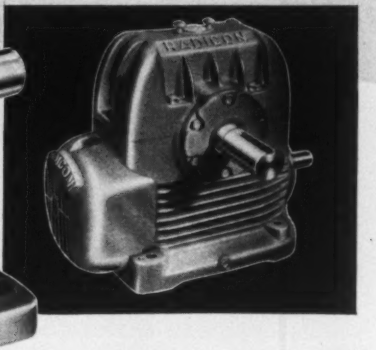
**Torqomotive Drive; Plymouth transmission coupled to hydraulic torque-converter.*

PLYMOUTH· LOCOMOTIVES
PLYMOUTH LOCOMOTIVE WORKS

FOOTE BROS. introduces a
FAN-COOLED

- High load carrying capacity
- Super-efficient 2-way cooling for higher thermal ratings
- Unlimited mounting positions
- Automatic and positive lubrication
- IN STOCK for immediate delivery

RADICON
LUBRICATION
RADICON



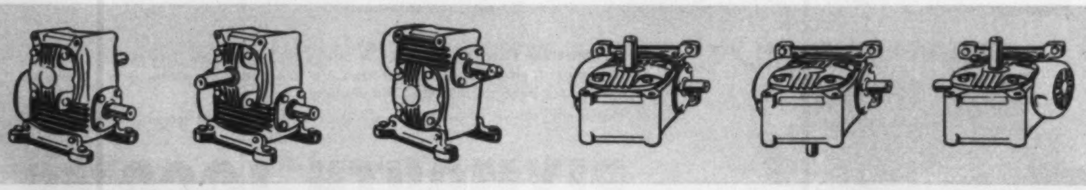
- **12 sizes—Center Distances from 1⅛″ to 8″**
- **Rated to NEW AGMA Standards**
- **Ratios from 5:1 to 70:1**
- **Output torque to 46,000 lb. in.**
- **Input capacities from .01 to 66 HP**

Foote Bros. RADICON Worm Gear Reducers incorporate *totally new* concepts of speed reducer design and construction. From the inside out and top to bottom, they embody years ahead thinking to provide users with more efficient, more versatile right angle power transmission in minimum size units.

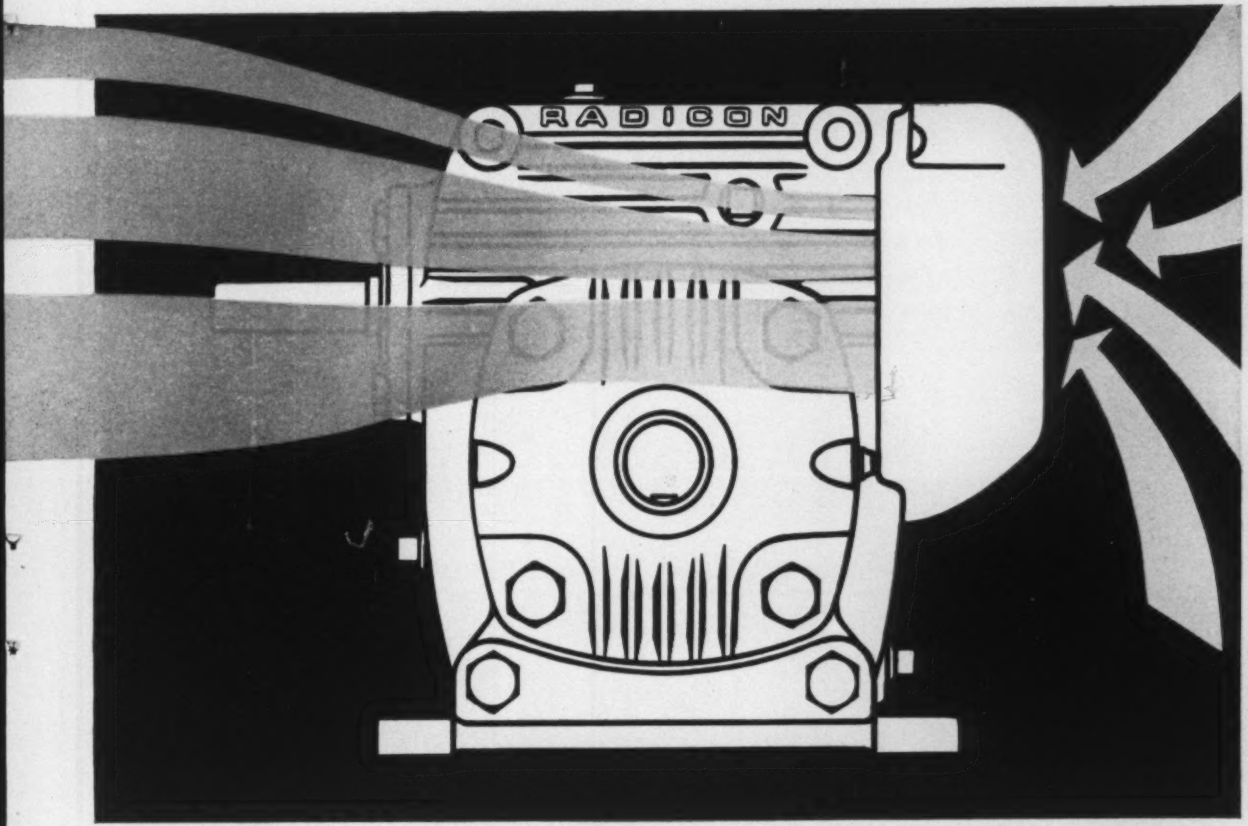
Gear accuracy and surface finish, bearing and shaft design, positive lubrication, extreme efficiency controlled cooling, the selection of materials and precision manufacturing techniques—all reflect careful attention to detail that results in higher load carrying capacity and maximum service life.

These outstanding new fan-cooled worm gear reducers are available now—carried IN STOCK by Authorized Foote Bros. Distributors for IMMEDIATE DELIVERY. See them soon. Get complete details on the performance, versatility, and service life they will bring you. Write for RADICON Catalog.

UNLIMITED MOUNTING POSITIONS



COMPLETELY NEW and ADVANCED line of WORM GEAR REDUCERS



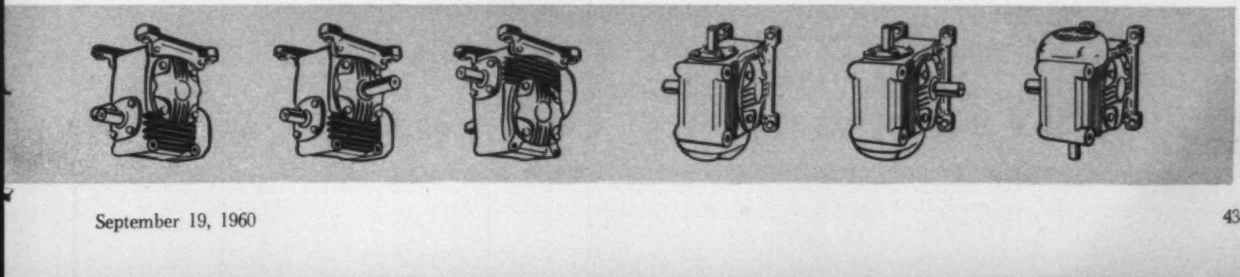
RADICON Reducers operate in a STREAM OF AIR for maximum thermal efficiency

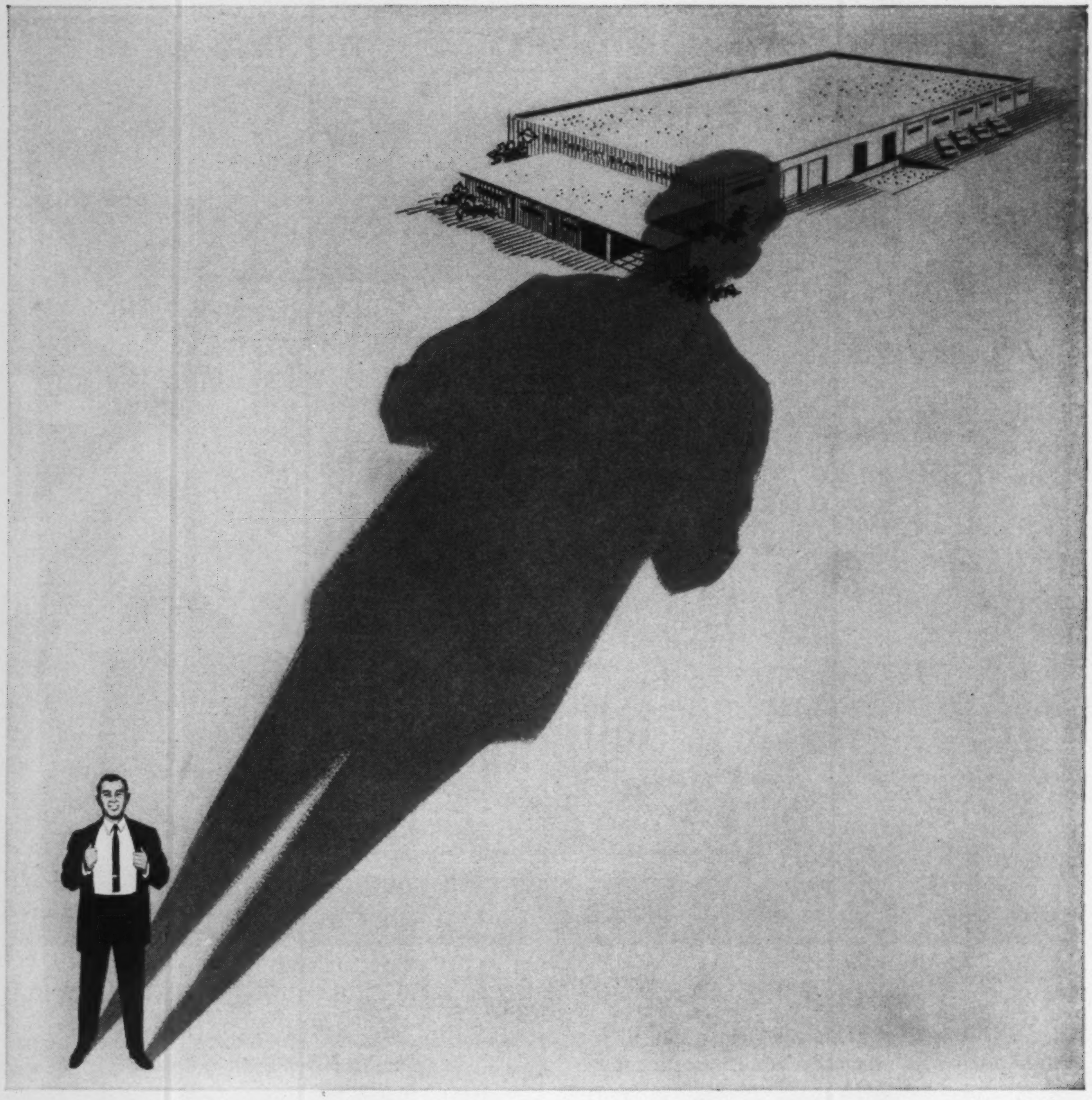
Advanced design of RADICON Worm Gear Reducers and their high efficiency radiation and convection cooling for controlled transfer of heat to the outside air, permit *identical* thermal and mechanical ratings in most cases. For infrequent or intermittent service, thermal ratings can be ignored.

A moving stream of air, induced by the maximum diameter fan, forcing high velocity cooling air along horizontal channels formed by the external ribbing, dissipates radiated heat to hold the Reducer's temperature rise to a minimum. Cooling is equally efficient at any mounting position.

FOOTE BROS. FB **GEAR AND MACHINE CORPORATION**
4583 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES





The small-volume customer is a BIG man at the BRIDGEPORT WAREHOUSE

WHY! It's Bridgeport's *policy* to give the same scrupulous service and attention to detail to every customer—small or large.

HOW! Bridgeport has a *nationwide* metals warehouse system. No matter where you are, you get fast service on Brass and Copper Alloy rod, sheet, strip and tube, and aluminum rod and strip. You'll find everything you need always on tap, ready for immediate delivery.

Fast delivery of *any quantity you require* is just one of the advantages your Bridgeport Warehouse offers. Others? For one thing, Bridgeport can save you time, money, and manpower by providing the exact sizes and metal characteristics you desire. And, of course, Bridgeport offers the best in technical service, based on generations of practical metals experience in every industry. *Getting* this Bridgeport Technical Service is as easy as dialing your telephone!

So always remember—no matter how large or small your requirements—they can be satisfied faster, easier—and *better*—at your local Bridgeport Warehouse! Call now!

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MELROSE PARK: MAnsfield 6-3640
MINNEAPOLIS: FEderal 9-7061
NEWARK (Hillside): Bigelow 3-0044
NEW YORK: EXeter 2-4290
PHILADELPHIA: JEfferson 5-3900
PROVIDENCE: Williams 1-2100
ST. LOUIS: CEntral 1-0076
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BRASS Bridgeport CO.

BRIDGEPORT BRASS COMPANY

Bridgeport 2, Connecticut • Sales Offices in Principal Cities • *Fast, Dependable Service on your Brass, Copper, and Aluminum Needs*

Route Slip

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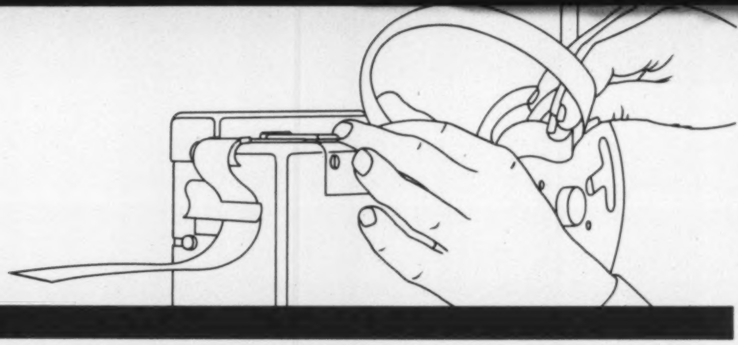
☐ ________

◀ For routing tear out on perforation.



HOW GIDDINGS & LEWIS TAPE CONTROL PAYS ON SHORT RUNS AT MIEHLE-GOSS-DEXTER, INC.

. . . AN INTERVIEW WITH THE MEN WHO TOOK THE COMPANY INTO "TAPE" AND SAVED AS HIGH AS $130,000 IN TOOLING FOR JUST ONE NEW PRODUCT

Everybody's talking about tape control and inevitably more and more will go into it. But the lag time between talk and do is penalizing many plants thousands of dollars in profits annually.

Miehle-Goss-Dexter, Inc., Chicago, world's largest manufacturer of graphic arts equipment, has gone further into tape-controlled machining than all but a few manufacturers outside the aircraft industry. Their experiences in all phases of tape, from the economic justification before purchase to the operating and maintenance know-how, are literally a guidebook to other manufacturers who are "looking" at tape.

The highlights are told here through an exclusive interview with Adrian Holmberg, Executive Vice President, Manufacturing, Miehle-Goss-Dexter, Inc., and key manufacturing personnel of two divisions, The Miehle Company and The Goss Company.

Question. What is the principal effect of numerically controlled machine tools on your manufacturing?

Answer. Numerical control of machine tools has been a real break-through in counteracting continuously rising costs.

In the five years since we bought our first tape-controlled machine, we have made tremendous strides in cost reduction, and the values are becoming more evident every day.

Q. You say you bought your first tape-controlled machine five years ago. How many do you have in operation now?

A. We bought a positioning table first. Now we are operating 19 numerically controlled machines throughout our three divisions. We have five Giddings & Lewis horizontal boring, drilling, and milling machines, including your new 6″ model. Incidentally, we believe that a good place to start in tape is with a horizontal machine, both to gain experience and realize immediate large savings.

Q. What prompted you to go into tape?

A. There were a lot of factors. We wanted to do the same or more work with fewer machine tools, to eliminate many jigs and fixtures, and to gain manufacturing floor space.

We operate what are really large job shops — an average run of a part seldom exceeds 50 pieces. Miehle-Goss-Dexter provides the graphic arts industry with many presses specially designed to customer specifications, and this sometimes means one-of-a-kind parts.

We sought to eliminate the tremendous costs involved in designing, manufacturing, and maintaining new jigs and fixtures.

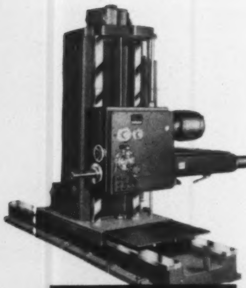
750 Fixtures Junked

Q. Have you realized the savings and benefits you anticipated?

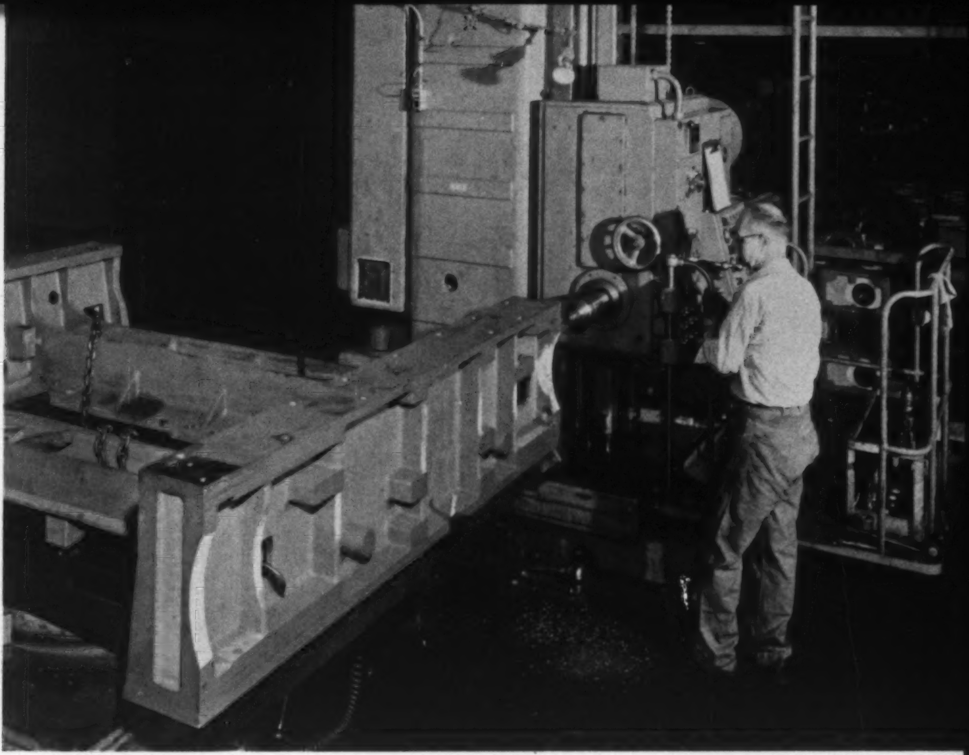
A. Yes, indeed. We have junked more than 750 fixtures in our various divisions. We also have fewer setups per piece and less material handling. We have saved floor space and improved accuracies.

There are big savings whenever we get a part design change or a new model machine to build. It takes from less than one man-hour to, say, 40 man-hours to process a manuscript and "tool" with tape — dependent upon the number of operations to be performed on the part.

We have a direct comparison on tooling costs for manually controlled versus tape-controlled machines. Before we bought the Giddings & Lewis at Miehle, we spent close to $150,000 for tooling to produce a certain product. Later we tooled for almost an identical product to be machined on the Giddings & Lewis for a cost of only about $20,000.



GIDDINGS & LEWIS



Q. On this tooling question, you eliminate jigs for positioning the tool, but what about workholding fixtures?

A. For the most part, we completely eliminate these, too. Because Industrial Engineering and Manufacturing study and establish the location of the part on the table, we often are able to use standard angle plates and locating stops as holding fixtures.

On some of the G&L's we use your air-lift rotary tables so only one setup is required.

Faster, Lower Cost Assembly

Q. Any other advantages of numerical control?

A. Accuracy and true duplication of parts. This insures quality of product and brings costsavings on the assembly floor. Everything lines up now. Assembly goes faster and easier.

Additionally, we eliminate other types of machine tools. For example, on certain parts we formerly did important holes on the jig borer — then sent the work to the layout bench. Even then we had fitting problems. Now we do this work with G&L machines and make truly interchangeable parts.

Walter G. Schalk, manufacturing engineer, The Miehle Company, Division of Miehle-Goss-Dexter, Inc.

Russell L. Hogin, machine tool co-ordinator, The Goss Company, Division of Miehle-Goss-Dexter, Inc.

Q. How accurate are your machines?

A. Our G&L machines consistently provide ±.001" repeatability on hole center dimensions. This accuracy has eliminated many checking operations and gages.

Tape Preparation

Q. Will you explain briefly the programming and preparation of the punched paper tapes?

A. These procedures are quite easily learned. It is important though that various departments become oriented and think in terms of tape-controlled machining.

First, it is desirable to have the Engineering Department put co-ordinate dimensions on their drawings for any operations to be performed under tape control.

Working from this type of dimensioning the Industrial Engineering Department uses standard forms to show workpiece location on the machine table, spindle location, speed, feed, type of tool, depth of feed, and explanation.

A fast, accurate typist transfers the industrial engineer's data to a master operations sheet in duplicate, using a typewriter which simultaneously punches a master tape and an auxiliary machine code tape.

The master tapes and sheets are filed.

Q. What type of personnel are best qualified to handle programming for tape operation?

A. Those who know something about shop practice. No special personnel are required.

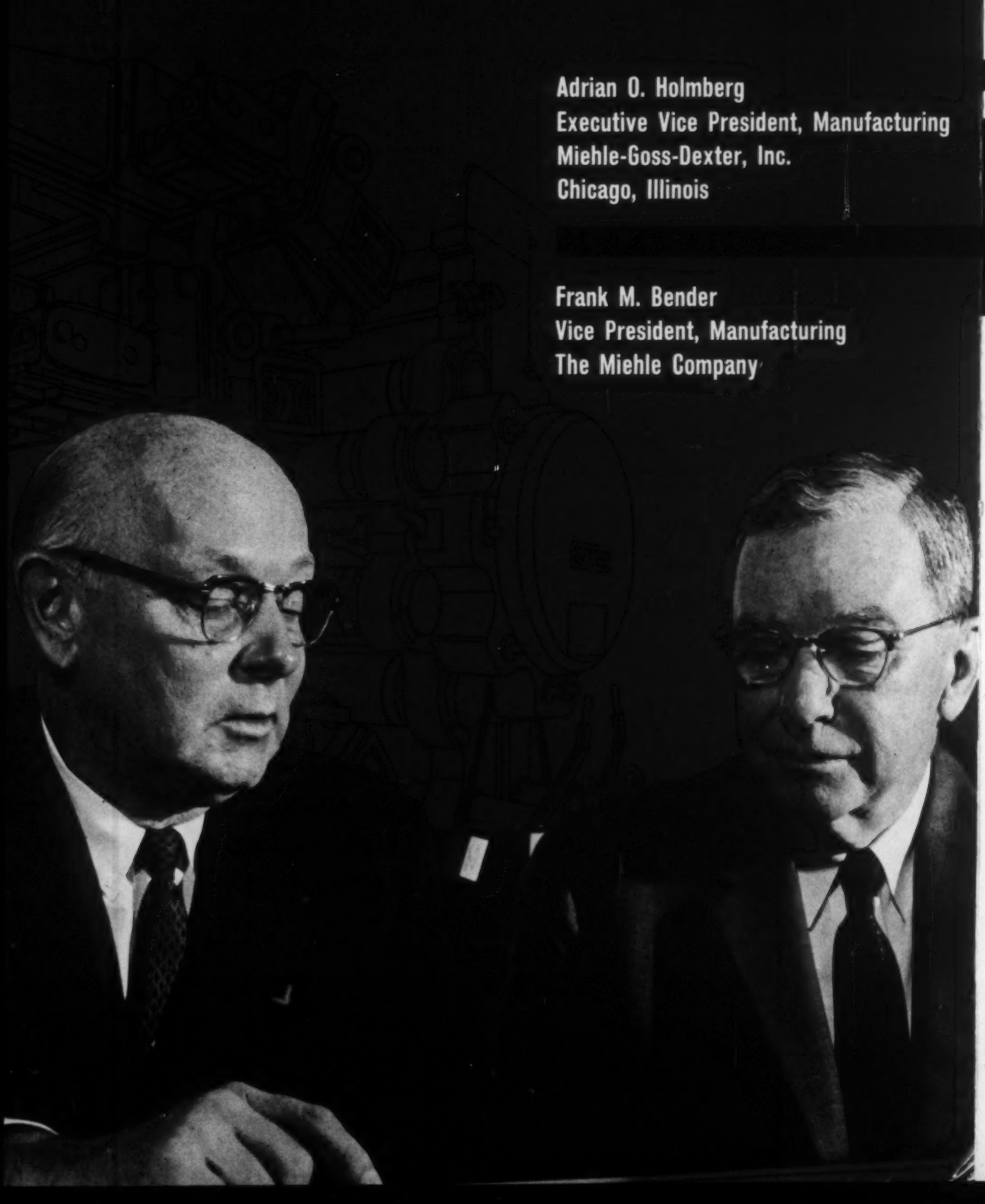
Industrial engineers are well qualified. In one plant we have a man from Methods who formerly did checking on tool drawings. Another was formerly a plant layout man. Still

"WE'RE USING TAPE-CONTROLLED MACHINE TOOLS

...TO ACHIEVE GREATER PRODUCTION WITH A MINIMUM OF EQUIPMENT SO WE CAN DELIVER BETTER PRODUCTS TO THE GRAPHIC ARTS INDUSTRY AT COMPETITIVE PRICES"

Adrian O. Holmberg
Executive Vice President, Manufacturing
Miehle-Goss-Dexter, Inc.
Chicago, Illinois

Frank M. Bender
Vice President, Manufacturing
The Miehle Company



Russell
This is a
Goss Co

GIDDINGS &

ell L. Hogin compares $12,111.48 in jigs "traded" for $513.20 worth of tapes! is a typical saving made with a G&L Numeripoint-controlled machine by The Company in machining the first of each of 17 new printing press parts.

another of our programmers had but six months' experience in our shops, yet mastered the job within a month and a half.

Q. About how many tapes have you made?

A. We have made and are using more than 12,000 different punched paper tapes in our plants. You can see that we have a lot of parts being produced under numerical control. Here is where a little paper work really pays off.

Q. Do you make one-of-a-kind parts under tape control?

A. Whether you make a tape depends upon the number of machining operations to be performed on a part, as well as upon the number of parts. Often we make a tape for only one part, particularly where high accuracy is required, or if we expect that we may ever be required to make a duplicate.

Of course, with the digital dial control on your Model 3045 horizontal, we can manually dial in the spindle position with the same accuracies as with tape. We frequently use this control for making one-of-a-kind parts or for very small runs where only a few holes are to be located on each surface. But if as many as six or eight holes are to be located on a surface, we find it is better to make a tape.

Q. Whom do you use for numerical-control system maintenance?

A. This presents no problem. Our regular electricians can handle it. The systems are becoming increasingly reliable. In a recent three-month period, we had 2,053 hours' running time out of a possible 2,223 for two machines, and that includes downtime for both machine and control maintenance.

Economic Justification

Q. What are the possible savings on your Giddings & Lewis machines?

A. We are saving anywhere from 10% to 40% over our previous methods, which were those commonly used today throughout the metalworking field.

We especially like the Giddings & Lewis machines because of their ease of operation and handy controls. You don't have to fight the job all day long. The floor-type machine also is very good for us because it gives us great flexibility in handling large or small parts.

Q. Would you care now to summarize the benefits of tape-controlled machining?

A. There are a number, as we have discussed. You get true interchangeability of parts. No hand rework on the assembly floor. Responsibility for accuracy control is put in the hands of the engineers. Chance for operator error is almost entirely eliminated. Many checking operations are eliminated.

Tooling costs are greatly reduced. Floor-to-floor time is reduced as much as 30 to 50%. Over-all manufacturing costs are lower.

We get big savings on prototypes — the first of a new type of machine. These sometimes call for modifications later — easy to make with tape.

Fewer machine tools are required to do the same amount of work. Savings in floor space are significant.

Last, but not least, there is less operator fatigue and less chance for errors. The operator observes predetermined specified operations of the machine instead of performing all the positioning and other work required with manually operated equipment.

Tape control really is management control of production. All in all, we don't see how any plant with short runs can afford not to use numerically controlled machine tools.

If you've been thinking about tape, there's no time like the present to discuss it with Giddings & Lewis — the people who built the first commercial tape-controlled machine tool and who have shipped more major machines with numerical control than any other manufacturer. Consult your local G&L distributor or write.

GIDDINGS & LEWIS

GIDDINGS & LEWIS MACHINE TOOL COMPANY, Fond du Lac, Wis., Est. 1859

Jig borers and milling machines; horizontal boring, drilling, and milling machines; vertical turret lathes; vertical boring mills; positioning tables; die sinking machines; contour milling machines; radial and upright drilling machines; planers; planer mills; numerical and tracer control systems; Davis boring tools.

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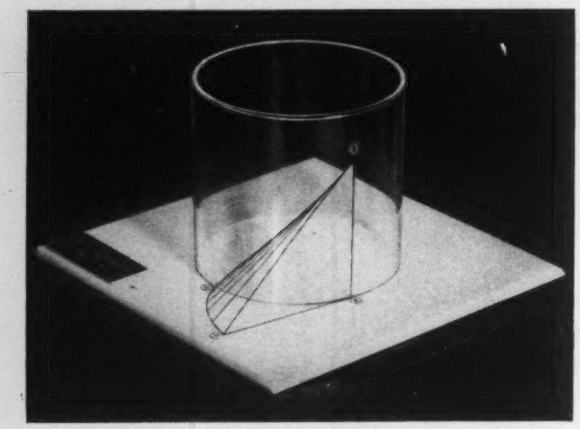
WORM GEARING

Why the INVOLUTE HELICOID thread form?

Introduction of involute helicoid worms by Delroyd marks the first time extensive use of this design has occurred in America. Therefore the question arises: "What is the involute helicoid worm and what are its advantages?"

Basically an involute helicoid worm is the same as an involute helical gear. However, this similarity is not easily recognized because of the difference in angle of thread or tooth helixes in the two types. Regardless of the difference in helix angles, both types have an involute thread or tooth profile in the transverse plane, i.e., a plane perpendicular to the axis.



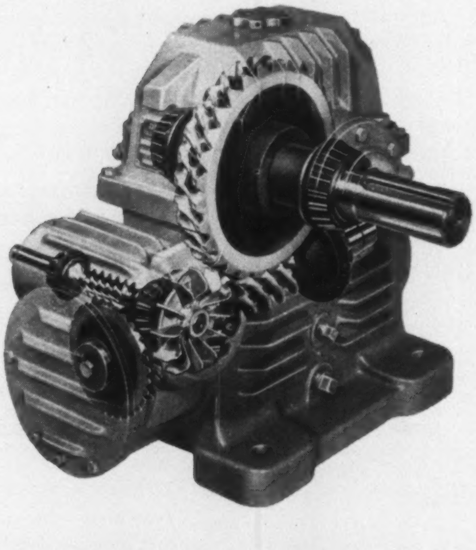
The thread surface is made up of a series of involute curves lying in transverse planes. The thread flank generating edge is a straight line tracing out a helical path (see illustration). Manufacturing *simplicity* of generating and checking to straight line form control provides consistent production of worm and generating hobs of high *accuracy*. Deviation from the straight line in checking *hundreds* of worms in one production lot can be held to within a few *ten* thousandths of an inch.

The easy and accurate attainment of ***exact similarity*** between worm and hob provides complete compatibility of worm to gear without manufacturing process interruptions to modify and change hob form. Form does not change as hobs are sharpened. Accurate interchangeability is an undisputed fact.

Only the involute helicoid worm form permits practical application of calculable compensating features for gear deflection under load. All gears have leaving side contact with entering side gap to form beneficial oil wedge. Kinematically accurate tooth meshing avoids the acceleration and deceleration inevitable with other forms.

Superior performance is the result, since this form outperforms all others. Size for size, the DELROYD involute helicoid worm form offers a higher selection safety factor with no premium cost.

For further information on DELROYD worm gearing, write on your company letterhead for our new 84-page catalog, the most comprehensive in the industry.



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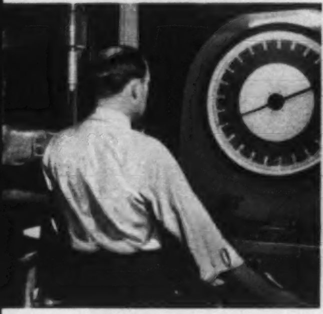
In T & W's engineering department the information about your job is studied carefully. Dies and production are planned to meet your requirements most economically.

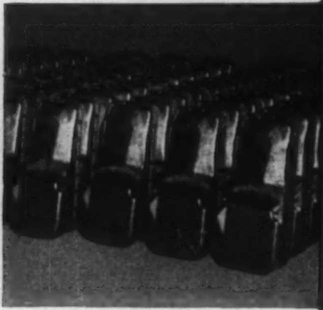
With over 140 hammers and presses, T & W is equipped to produce a wide range of forgings, from a pound in weight to over 500 lbs.

T & W's wide range of stamping presses, economically produce stampings from 3" x 3" to large stampings 40" by 60" by 14" deep.



Fully equipped laboratories provide the control of quality required for space-age metals and products.

Excellent quality control makes T & W forgings and stampings reliable, one reason why they cost you less at your point of assembly.



Delivery to you is precisely scheduled to your requirements—a big, wide range operation like T & W has the reserve power to hold to commitments even in emergencies.

T & W CAN HELP YOU SAVE MONEY!

T & W's wide range facilities help you do it

Your part requirements can be produced most economically when the right *size* and *type* of equipment is utilized. Part cost economy is the result of planning by T & W people experienced with *know-how* for doing a good job without waste.

T & W's wide range of equipment, broad engineering knowledge in serving all types of industries, die designers, and production men all contribute to the T & W technique for saving you money. Ask to have a T & W sales representative call to give the details.

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HOW WIDE RANGE FACILITIES HELP INDUSTRY

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From its wide range facilities, T & W can choose the equipment to forge this 14" spindle, producing the required radial grain flow for maximum strength in the 5" head.

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The booklet "Transue & Williams Challenges the Future" explains the wide range of facilities, and experience, which enables T & W to serve all American industry, and produce savings.

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& DEEP DRAWN
STAMPINGS

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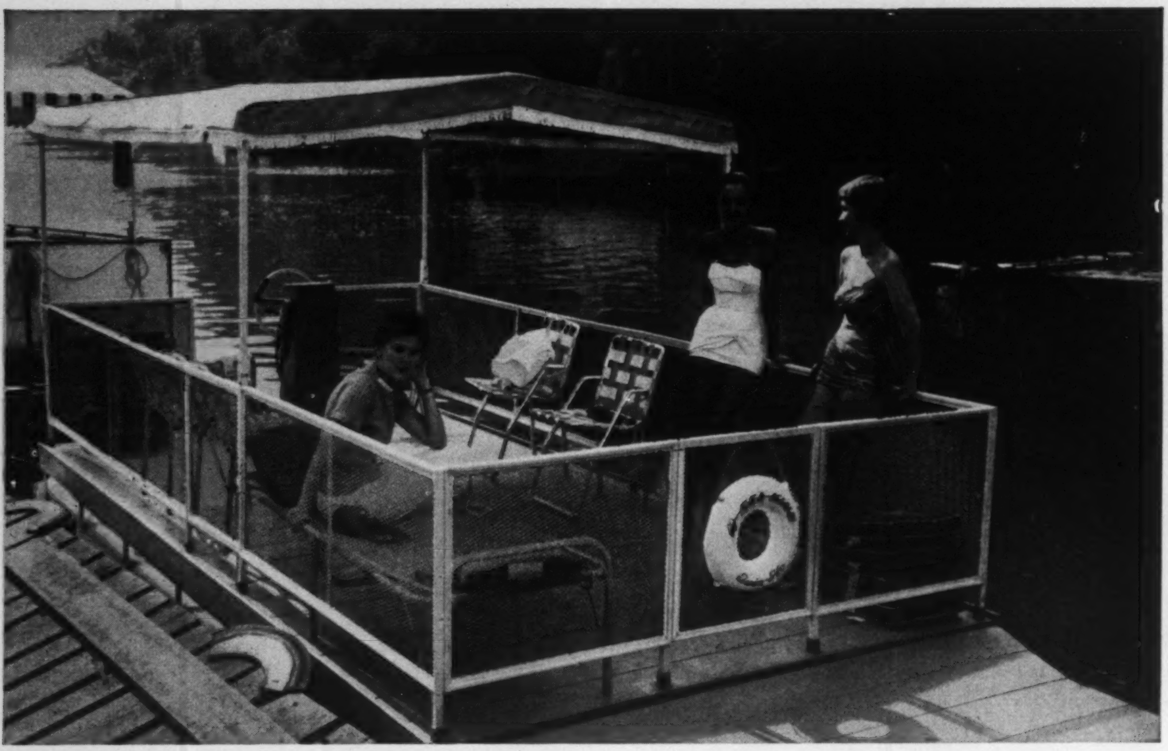

Penmetal expanded metal helps you sail with security on this versatile pontoon boat

In designing and building the "Twin-Flo" pontoon boat, Modern Welding Company has placed the emphasis on comfort . . . and safety. That is why Penmetal expanded metal was chosen for the railings and gates.

Strong, yet light in weight, this diamond mesh provides superior security for those on board, without adding significantly to the over-all weight of the vessel. Expanded metal has the rigidity to span large areas in an unbroken sweep; the stamina to withstand the abuse of every day use. What's more, it adds much in the way of appearance, having that simple, functional look typical of good modern design.

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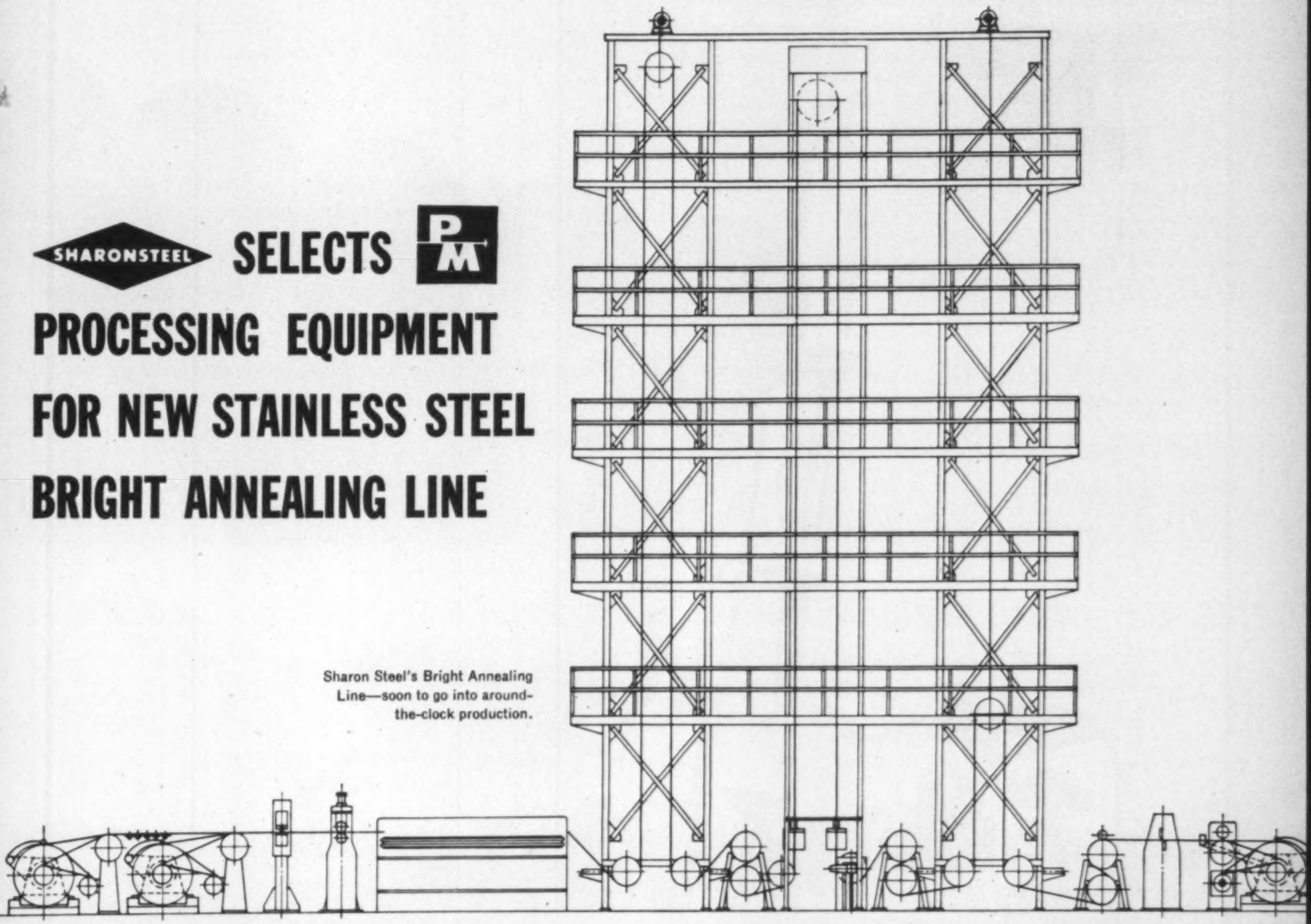

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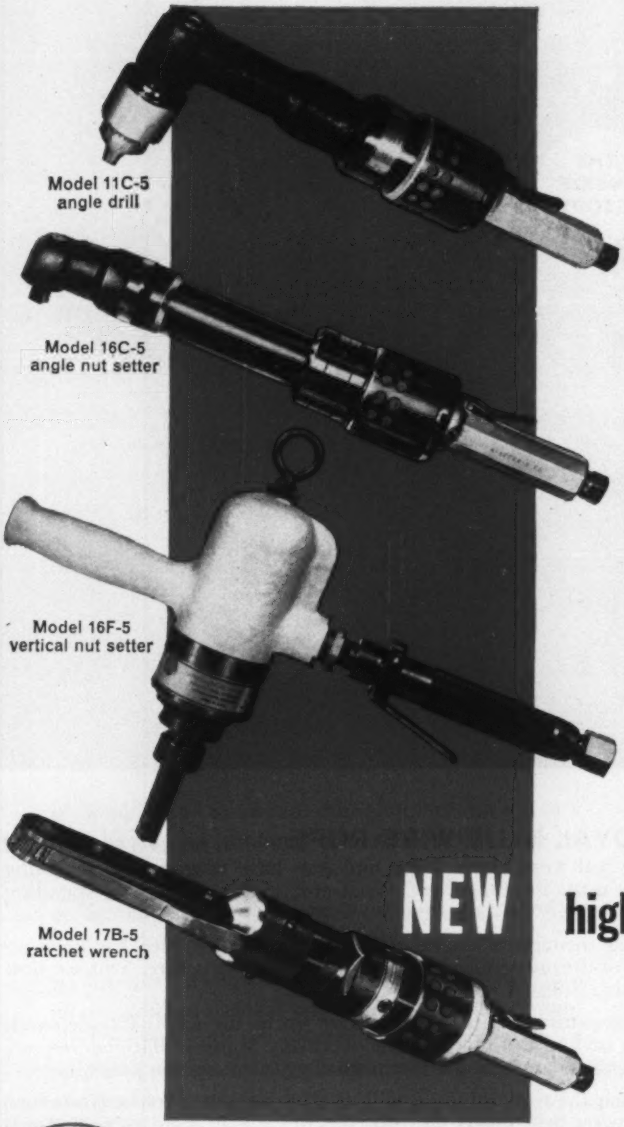

Model 11C-5
angle drill

Model 16C-5
angle nut setter

Model 16F-5
vertical nut setter

Model 17B-5
ratchet wrench

Here's a new line of heavy-duty air tools that offers you new production line speed and efficiency. New, compact air motor design gives you more power and less noise than ever before. This new Gardner-Denver line brings you the ultimate versatility, interchangeability and adaptability. Look at what it includes:

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Designed for close-quarter drilling, it's a versatile performer in the ⅜″ to ¾″ drilling range. It has the speed required for drilling light metals and the power to drive large drill bits.

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Delivers fast run-down, with final high-torque setting of bolt. Side handles for ease of positioning and absorbing torque reaction. Choice of clutches for accurate torque control. For ⅜″ bolt capacity.

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Your solution to large nuts in awkward places, this wrench handles high torque to 150 ft-lb . . . tightens nuts up to 2¼″ diameter. Yet, it has the versatility and durability of other Gardner-Denver ratchet wrenches.

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THE
INSIDE
STORY

ROEBLING
ROYAL-1105-BLUE

ROYAL BLUE—*we put a lot of work into it—You get a lot of work out of it.*

ROEBLING ROYAL BLUE WIRE ROPE This is rather a long view of a wire rope that's a real work horse. Time and tests have taught us at Roebling that wire rope users *want* the long view. What else, they say, are they spending their money for?

Here, you're looking through a length of Royal Blue whose core has been removed to show the uniformity and symmetry of the rope structure. You see how concerned we are with internal security.

This is one of the reasons why Royal Blue lives up to the day-to-day demands made upon it. High stresses and unavoidable overloads, abrasion, fatigue, impact, crushing, sheave pressures and abusive drum-winding, to name the major ones.

We have to know that the rope we build will do what we sell it to do. Numerous quality-control measures help us—as they do you—to take the long view of Royal Blue. For details about long-lasting Roebling Royal Blue, ask your wire rope distributor or write Roebling's Wire Rope Division, Trenton 2, New Jersey.

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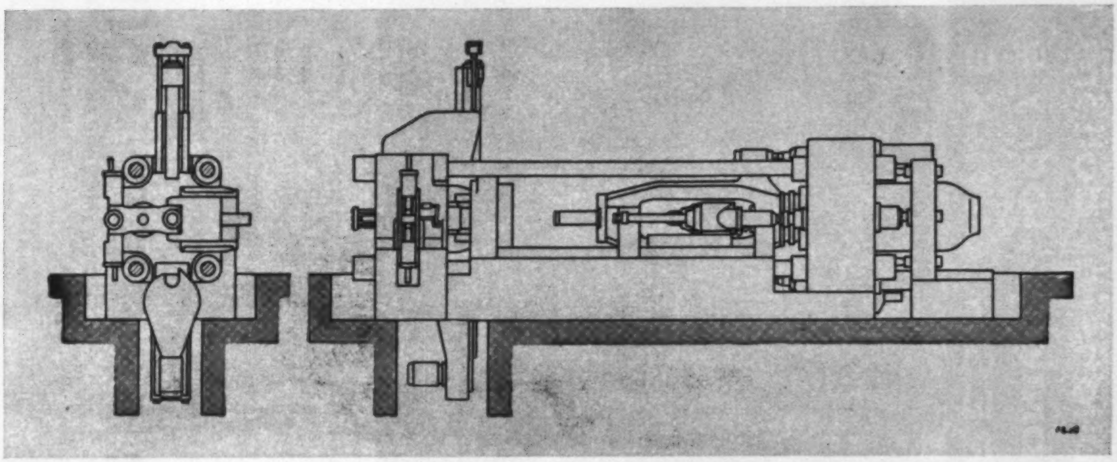
New Extrusion Presses

SCHLOEMANN extrusion presses of new, improved design are the result of intensive research and development work. New features have been introduced in both the press units for rods and tubes and the auxiliary equipment including the power station. These new features, combined with carefully designed controls permitting automatic programming, offer substantial savings in operation.

You are invited to contact us for complete information on these presses.



Horizontal extrusion press for non-ferrous metals with rotary die head and internally-arranged piercer.

Features and advantages

- Good accessibility to the press and tools through effective arrangement of the columns, tie-bars and guideways, and through a long-stroke container shifting device.
- Simple and quick tool changing through a rotary die head, die changer and quick-action locking arrangements.
- Speedy removal of the extrusions by severing behind the die. (Axial displacement of the die).
- Compact design of the press and efficient mandrel guidance through an internally-arranged mandrel manipulator or piercer with mandrel stroke adjuster, mandrel stroke limiter, relative stroke mechanism and mandrel turner.
- Improved quality of extrusions and longer tool life through the incorporation of cooling arrangements for the billet container, die and mandrel.

Inspecting a 2750-ton extrusion press of the four-column type, with rotary die head, demonstrated under workshop conditions on the occasion of the SCHLOEMANN Congress held at the MAN plant at Nuremberg.

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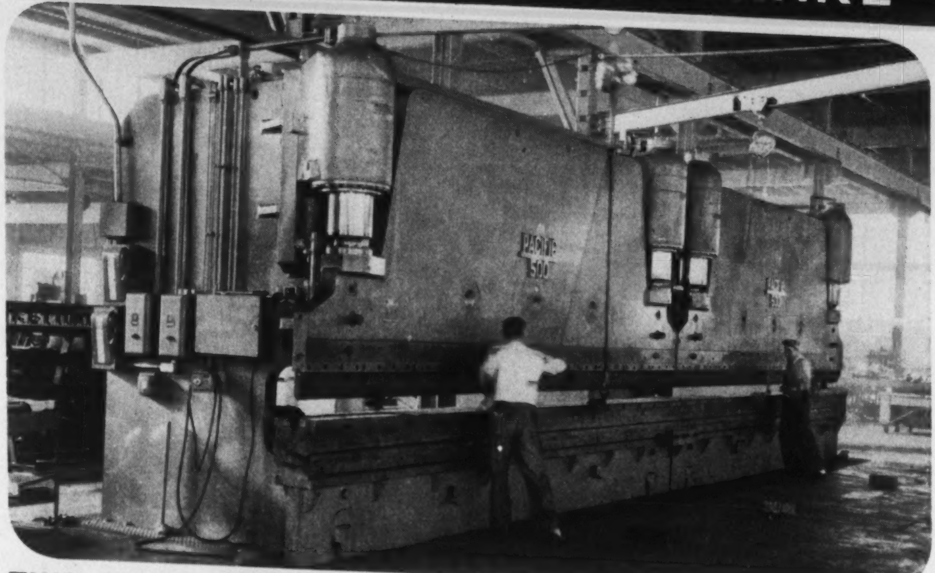

TWO 20 FT. BRAKES OPERATE AS ONE to punch and form 40 ft. checker plate in single hit. By purchasing two 500 ton PACIFIC brakes which can operate together as a single 1000 ton brake 40 feet long or as two independent 500 ton machines, each 20 ft. in length, this custom fabricator found the practical means to form tremendously long pieces without an additional investment of tens of thousands of dollars for a single 40 ft. long 1000 ton machine. The company also gets the benefit of double production in forming shorter sections.

*THIS INVESTMENT ENABLED PACIFIC TO INTRODUCE:

- Tape control to synchronize cylinders within .003" (1947)
- Cushioned punching (1949)
- Precision depth control to repeat accuracy within .001" (1951)
- Manual turret stroke controls for progressive bending (1952)
- Selective anti-whip speeds to eliminate reverse bends (1952)
- Tandem operation of press brakes for forming pieces 40 ft. or longer (1953)
- Tonnage control to protect light dies in heavy press (1953)
- Multiple hydraulic cushion cylinders for deep drawing (1954)
- Overhead integral power unit for increased accuracy (1955)
- Cylinder ram guides for increased rigidity (1956)
- Shearing attachment for shearing heavy plate on press brake (1958)
- Pipeless stacking of valves to eliminate pipe breakage and leakage (1959)
- Shockless hydraulic valving to eliminate cause of leakage (1959)

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AA-1477

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Subsidiary of Howell Electric Motors Company
HOMER MANUFACTURING DIV. • Lima, Ohio

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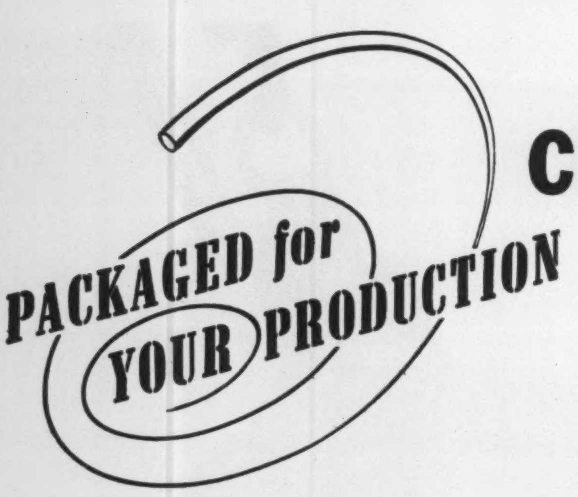
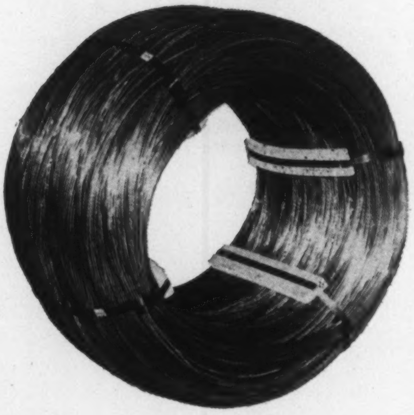
ELECTRIC

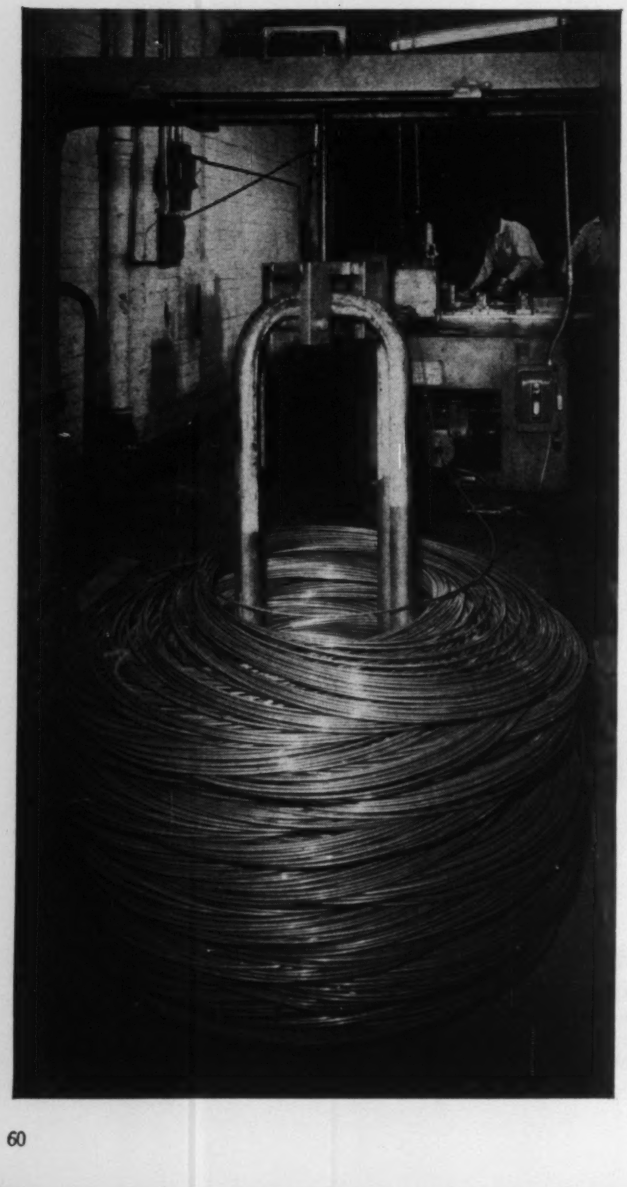
Ohio Also Makes Separation Magnets • Nail Making Machines • Fractional Horsepower, Shell and Torque Motors



CF&I WIRE HELPS



Compact shaped coil ready for shipment



"CF&I shaped coils have saved us 25% in storage, 20% in downtime, have increased our production by over 20%, and have enabled us to produce a higher quality product."—said Mr. Sol Lipshitz, president of Reforce Steel and Wire Corp., Brooklyn, New York.

Problem: "Previously with small coils, we had to stop our machine every 25 minutes to butt-weld the end of a new coil to the used-up coil. As we had to go to this trouble twenty times a day, we were losing 1½ to 2 hours daily in downtime," explained Mr. Lipshitz.

Solution: "A CF&I salesman carefully examined our operation; then he suggested that we use CF&I shaped coils which hold 2500 pounds of continuous length wire, as opposed to 200 or 300 pounds. As a result, we now stop our machine only once to start a new coil, instead of 10 times every day. We save nearly two hours, and have increased production by 20%.

"In addition, CF&I shaped coils have greatly reduced unloading time. Now when we receive a truckload of wire, we unload and store 15 pieces instead of 200. This not only saves time, but freight expenses as well because we now store much more and have to order one-fifth as often."

CF&I heavy coil mounted on spider for pay-off. This heavy coil contains 2500 pounds of continuous length of wire—enough wire for one-half day's production at the Reforce Steel and Wire Corp. "By virtually eliminating downtime with these heavy coils, we have increased production by 20%," said Reforce's president.

CUT DOWNTIME 20%

at Reforce Steel and Wire Corporation, Brooklyn, N. Y.

Heavy coils are quickly and easily placed on a revolving spider. The spider, which is leased from Wickwire, acts like a spool and assures smooth, even pay-off. "Because our machine jerks rather than drawing steadily, the small coils frequently pulled over and became tangled," explained Mr. Lipshitz. "CF&I heavy coils on spiders give us a steady flow of wire and make our operation more uniform."

Here you see some of Reforce's finished reinforcing accessories. "CF&I heavy coils have increased the quality of our product," said Mr. Lipshitz. "Small coils require frequent coil end welding. Sometimes, due to different coil melting temperatures, our automatic welding machine failed to make a good bond, forcing us to re-weld some faulty joints. CF&I long length coils have eliminated this problem."

Choose the CF&I wire package that offers one or more of the following benefits for your production:

- **less downtime with extra-long lengths of wire**
- **quick unloading and easy in-plant handling**
- **simplified inventory control**
- **assured cleanliness of the wire**

Our salesman will be glad to study your operation and recommend the wire package that will save you time and money. Call the nearest CF&I office today to set up a "no obligation" appointment.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

CF&I STEEL

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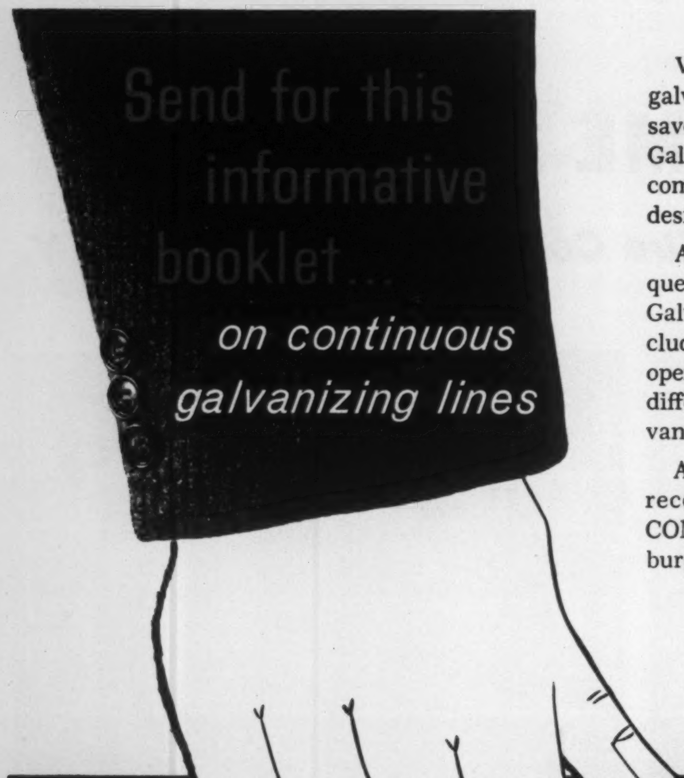

Send for this informative booklet... on continuous galvanizing lines

What makes the difference between one galvanizing line and another? How can you save money on the purchase of a Continuous Galvanizing Line? What are the different components that must be considered in the designing of a line?

Aetna-Standard answers these and other questions in this new booklet on Continuous Galvanizing Lines. Other information includes information on the number of lines operating in the world; and pictures of different components of Continuous Galvanizing Lines.

A copy will be mailed promptly upon receipt of your request. BLAW-KNOX COMPANY, Aetna-Standard Division, Pittsburgh, Pennsylvania.

BLAW-KNOX

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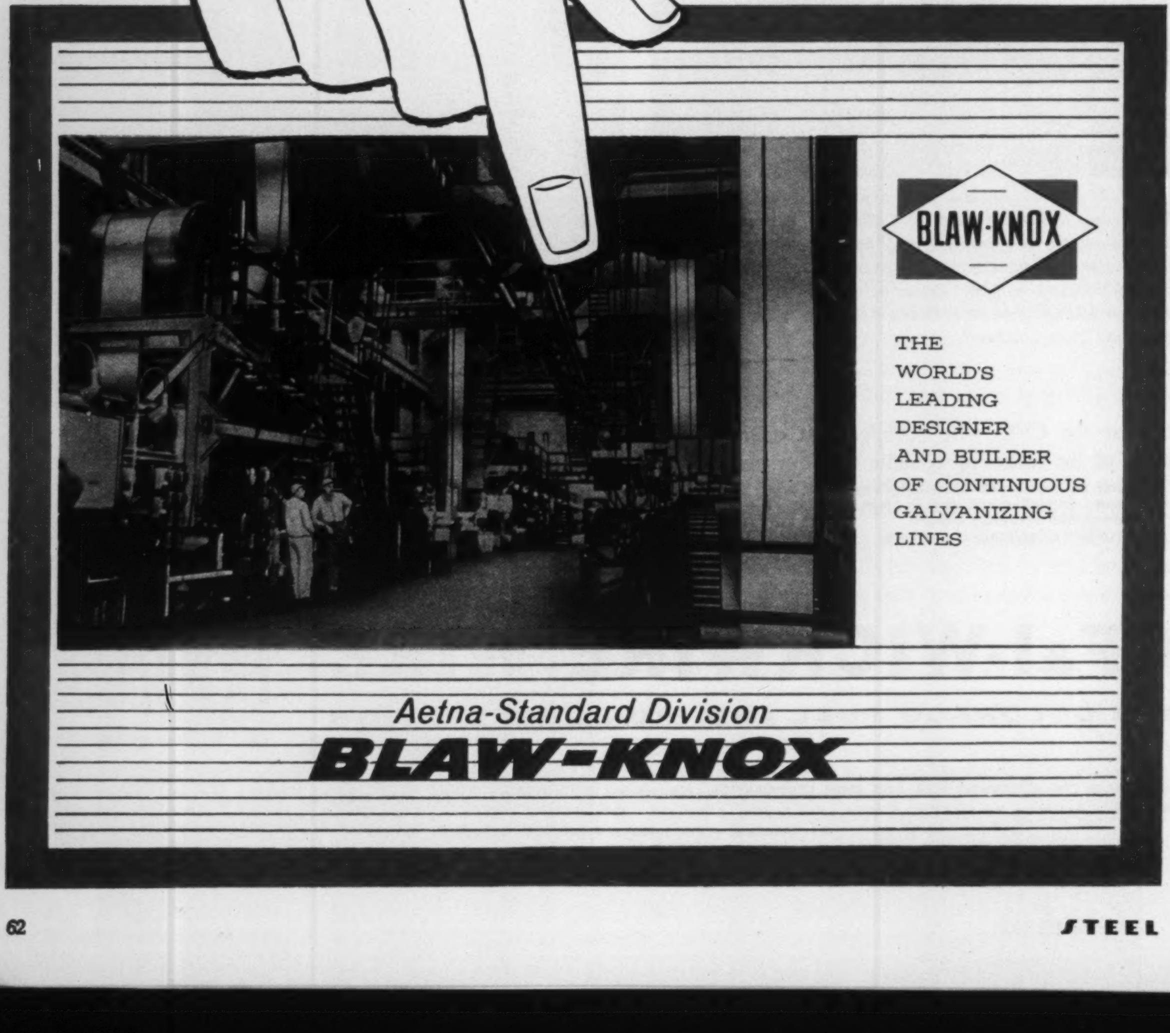

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OF CONTINUOUS
GALVANIZING
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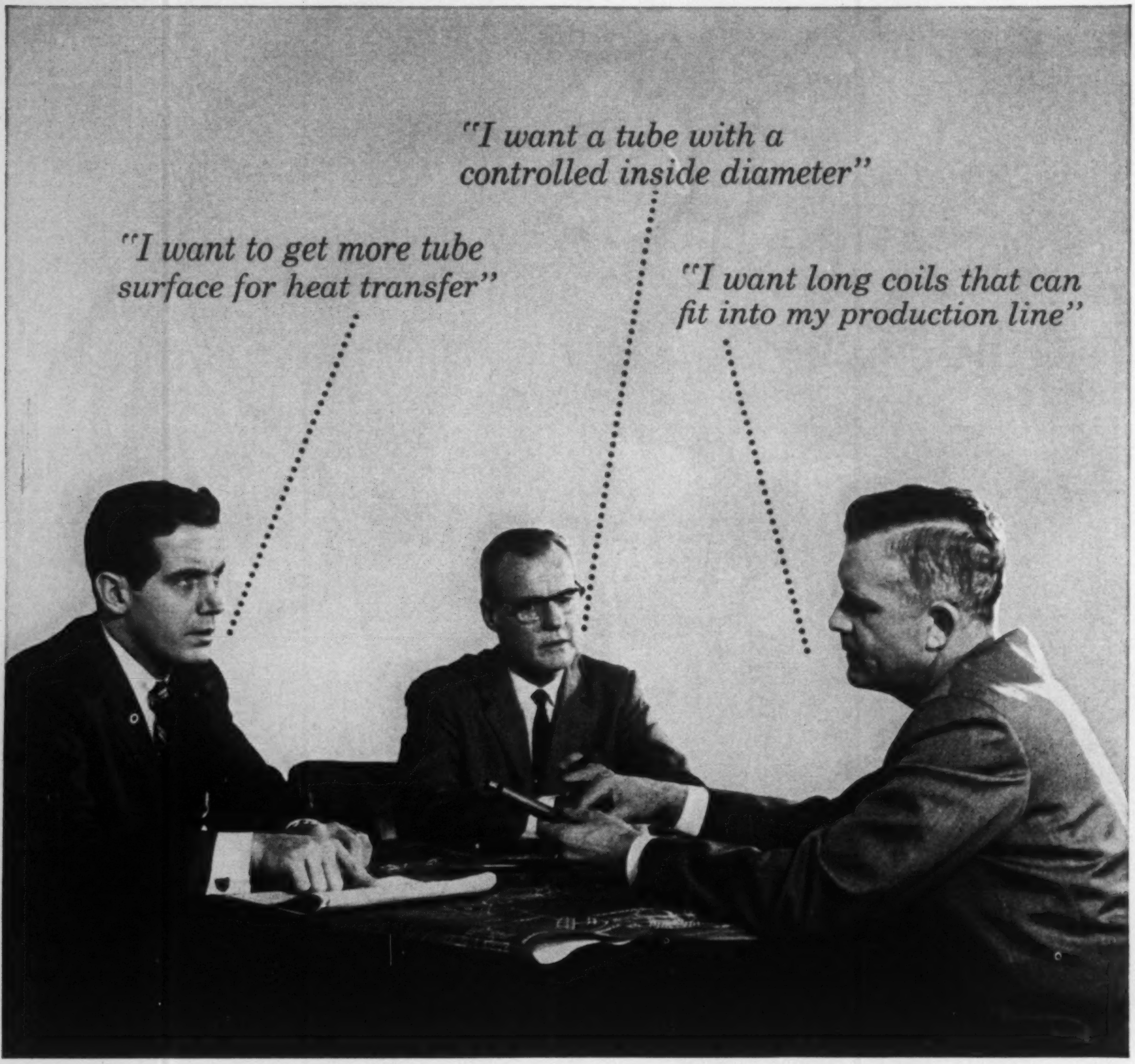
"I want to get more tube surface for heat transfer"
"I want a tube with a controlled inside diameter"
"I want long coils that can fit into my production line"

"I want *more* than just a tube!"

Men who know tube want just a little bit *more* when they buy.

If they are interested in heat exchange, for example, they weigh carefully the advantages of using capacity-boosting Wolverine Trufin®—an integrally finned tube.

If they have to meter a liquid, gas or air—get just the precise amount for a given application—they insist upon precision-made Wolverine Capilator®.

And if they have to step up production of tubular shaped parts while saving premium floor space and inventory, they go for Wolverine level-wound coils.

All of these are Wolverine developments. All of them have been designed to answer a customer want. In petroleum processing—in air conditioning and refrigeration—in metalworking—in many, many industries, products like these are providing engineers with more than just a tube.

And Wolverine research and development promises even bigger developments. They'll be designed to solve customer needs in the fields above along with plumbing, power, electrical, nuclear and many others.

Yes, men who know tube, know the difference. It's Tubemanship! Write for your copy of the Wolverine Tubemanship book today.

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Manufacturers of Quality Controlled Tubing
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Longer Life! Superior Dependability!

THE ALLEN-BRADLEY LINE of BULLETIN 700 RELAYS IS COMPLETE!

TYPE B general purpose relay shown with 2 N.O. and 2 N.C. contacts. Made with up to 8 poles in various arrangements.

TYPE BX universal relay shown with 4 poles having both N.O. and N.C. contacts. Additional contacts on the 6 and 8 pole relays are N.O. only.

THESE IMPROVEMENTS ARE *IMPORTANT!*

These improved Bulletin 700 Type B and Type BX relays are establishing new standards for relay life and reliability. New design increases mechanical life by *at least 5 times* . . . a new contact motion insures *at least 10 times* greater electrical reliability. Double break, silver contacts never need maintenance, and the new molded coil is impervious to the most severe atmospheric conditions.

These new A-B relays—with their *extra millions of trouble free operations at no increase in price*—are a bargain in the relay field. Write for complete details, today.

NEW ENCLOSURES

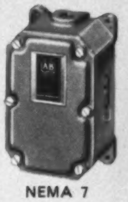
for the Bulletin 700 relays are styled by Brooks Stevens—internationally famous industrial designer. Note the "family" resemblance of these enclosures.

NEMA 1

NEMA Type 1 for general purpose applications with wrap-around cover for ready accessibility. It has a "quality" appearance.

NEMA 4

NEMA Type 4 enclosure for applications that require a watertight and weatherproof seal.



NEMA 7

NEMA Type 7 enclosure for NEC Class 1, Group D hazardous gas locations.

11-60-M

TYPE BR Bulletin 700 convertible contact relay shown with four poles. Made with up to six poles in line.

No other relay offers such simplicity in changing contacts from N.O. to N.C. (or vice versa)—it takes only 60 seconds!

A four pole unit provides any of the contact combinations otherwise available only with five relays of the fixed contact type. You can reduce your relay inventories. In tests, this relay has *proved* it will provide many millions of trouble free operations. Double break, silver contacts never need servicing. Also, each relay can have one or two complete and full rated contacts added to its base—in the field—without increasing space requirements. If you don't know about the Type BR relay, let's get acquainted.

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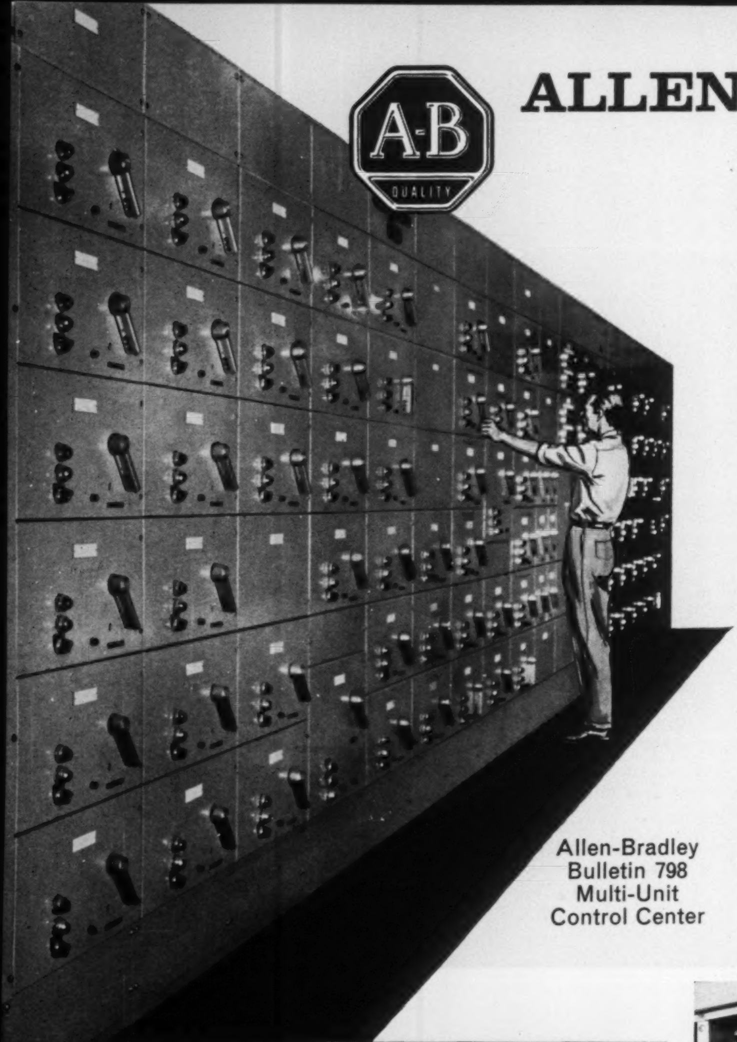
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley, Canada Ltd., Galt, Ontario

QUALITY MOTOR CONTROL



ALLEN-BRADLEY

Quality Control Centers

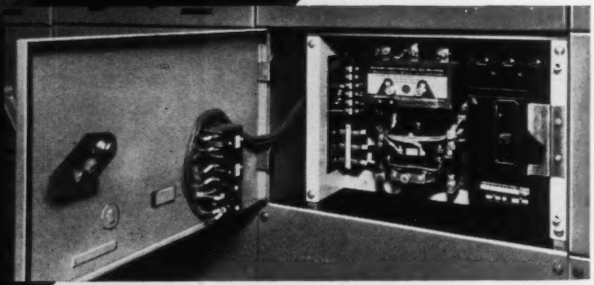
...the mark of a modern plant providing the utmost in reliability, safety, convenience, and lasting beauty

Allen-Bradley
Bulletin 798
Multi-Unit
Control Center

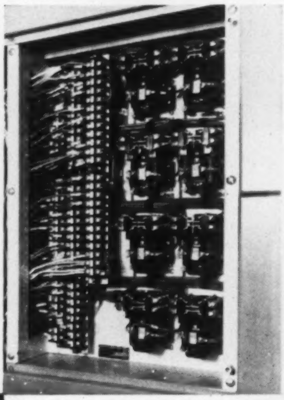
The superior *quality* of Allen-Bradley control centers provides a modern and attractive installation —one that you'll be justly proud to have in your plant. The cost is commensurate with the quality of the workmanship—but you'll never have reason to regret your decision. Furthermore, Allen-Bradley control centers arrive completely wired and tested —and *installed* costs are usually substantially lower than that of individual starters.

The flexibility of A-B control centers makes them readily adaptable to changing needs. Individual units can be added or modified without internal rewiring. In addition, entire sections can be added to meet future plant expansion.

For the finest in control centers, you cannot surpass Allen-Bradley's Bulletin 798. Write today.

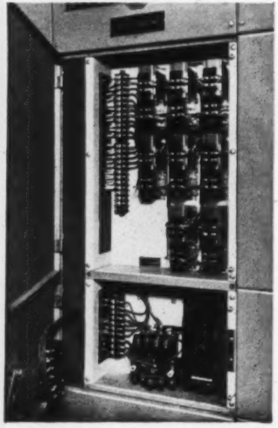


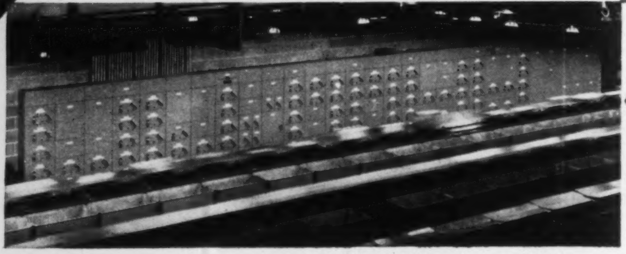
This shows A-B control center unit with popular A-B Bulletin 709 solenoid starter and circuit breaker.



This shows A-B Bulletin 700 control relays mounted in an A-B control center unit.

A-B control centers can be equipped with a wide variety of components. These Bulletin 849 timers are used on an automatic conveyor line.





This huge, 48-foot A-B control center houses 101 A-B Bulletin 709 solenoid motor starters. It is designed to permit an addition containing 50 more Bulletin 709 starters.

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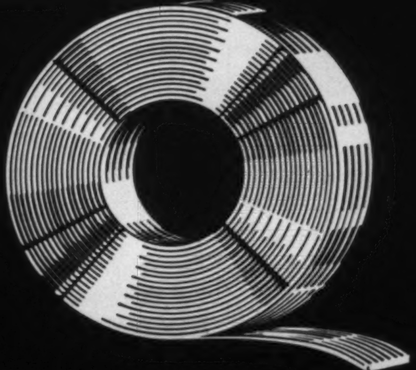
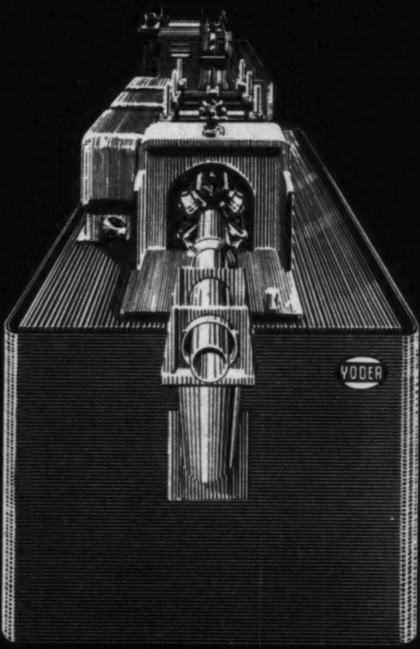
QUALITY MOTOR CONTROL

... from start





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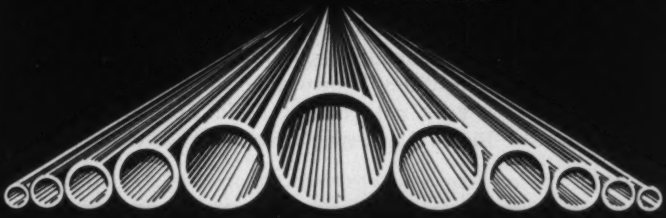

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COLD ROLL FORMING MACHINES
ROTARY SLITTING LINES

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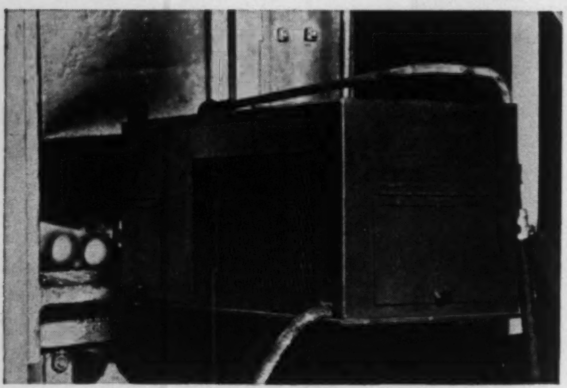
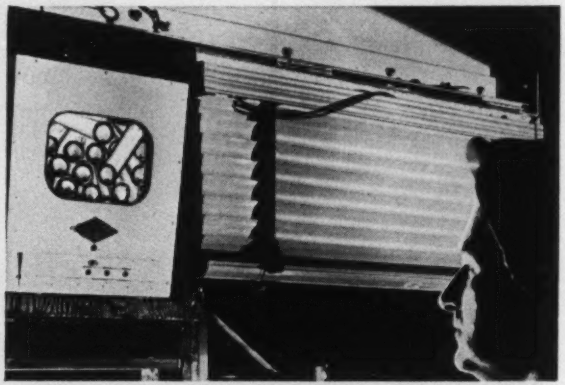
How Diamond TV cuts costs for Timken Company

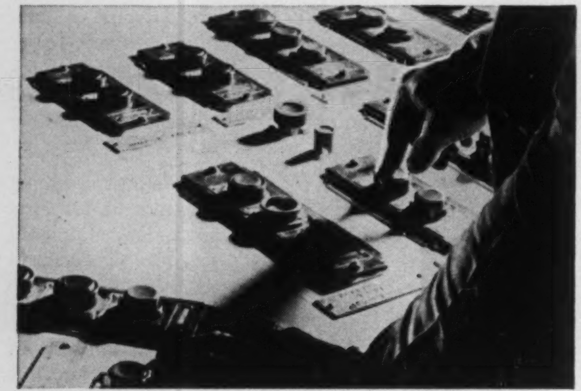
"Utiliscope"® *pays for itself in just eight months*



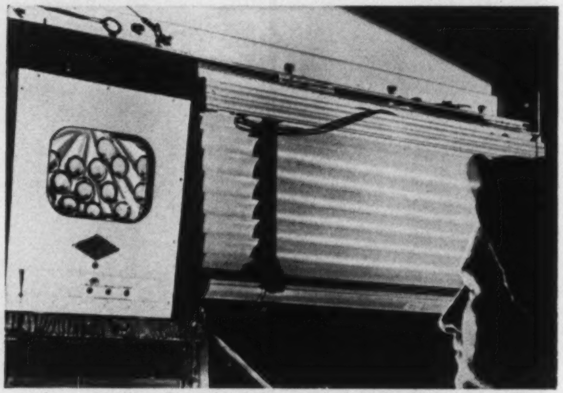
1 Air-cooled TV camera peers inside tube-cooling furnace, transmitting continuous picture to dispatcher in control pulpit 100 feet away. Dispatcher checks television monitor image which shows progress of tubes on walking beam conveyor — watches for pile up of tubes at conveyor exit.



2 Dispatcher, monitoring TV screen, spots a tube pile up instantly. Time lag in old method . . . hand signals from man at furnace port . . . could not have prevented piled tubes from gouging furnace refractory lining before conveyor could be stopped. Costly damage is eliminated . . . production efficiency improved!



3 With piled tubes realigned, cooling production continues with conveyor speed adjusted to prevent recurrence. Dispatcher now flips to second "Utiliscope" on adjacent annealing oven — the next step in tube production where tubes are piled cord-wood style.



4 In annealing furnace, tubes are picked off one at a time at back of furnace by powered rollers under dispatcher's control. Here, dispatcher watches for bridging of tubes which can prevent movement onto delivery conveyor. All clear here, again no spotter is required, again production flow is smoothed and protected with extreme accuracy.

In summary, one dispatcher at Timken's Canton, Ohio, Steel Mill now controls with greater overall efficiency: (1) tube mill, (2) tube cooling furnace, (3) annealing oven. Ambients at the camera location are above 125°F. Tube making is a hot process. It is in this hot spot that signalmen, formerly required, had to work. The signalmen are now working on more skilled jobs in relatively cool work areas.

Diamond's "Utiliscope" provides the metals industry the opportunity to eliminate non-productive tasks, centralize production control, reduce waste, increase employee morale, and gain new operating safety.

Our trained application engineers know the problems of providing effective trouble-free service in hot, tough, dusty locations. They are available to you as assistants in your analysis of the application of television to your open hearth, oxygen process, slab reheat, melting tables, strip mills, shears, raw materials, handling, pouring . . . or any of the other more than thirty known applications.

Why not request Field Survey FS33A today? Phone Lancaster, Ohio, OLive 3-6540 or TWX 490.

HELP WANTED . . . *Challenging opportunities available at Diamond Electronics for physicists, electronic and mechanical engineers. Contact C. H. Thomas, Technical Personnel.*

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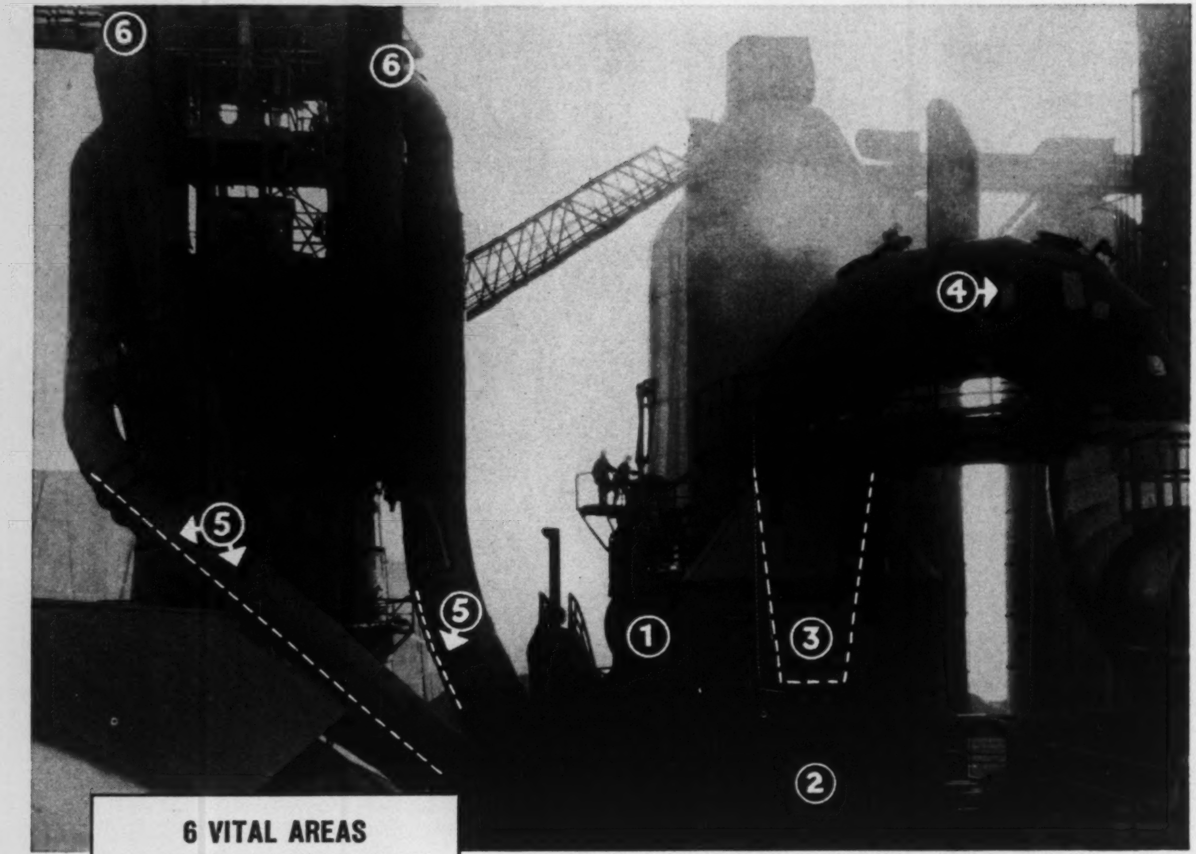
Calcium-Aluminate Cement

Industrial concretes protect blast furnace "hot spots"



6 VITAL AREAS REPAIRED WITH LUMNITE

gun-applied industrial concretes in blast furnace downcomers and dust separator, National Tube Div., U. S. Steel, McKeesport, Pa.

1. **Dust catcher,** spot repairs to brick lining.
2. **Dust separator** shell, complete lining.
3. **Inner cone,** complete lining.
4. **Elbows and piping,** lined for 65 lineal feet.
5. **Downcomers,** gunited for 120° arc in pipe bottom.
6. **Connections between uptakes and downcomers,** spot-repaired (two other connections gunited not shown).

For repairs or new installation, industrial concrete linings in blast furnace equipment solve many abrasion, erosion and heat problems. In addition, these monolithic concrete linings provide insulation. Made with LUMNITE calcium-aluminate cement and suitable aggregates, concrete linings are easy and economical to place – by guniting, casting or troweling. Unit downtime is reduced because concrete reaches service strength in 24 hours. For greater convenience, castables containing LUMNITE cement are available from leading manufacturers of refractories. These are packaged mixtures, ready to use by adding only water. For more information, write Universal Atlas Cement, 100 Park Avenue, New York 17, New York.

L-199

"USS," "Atlas" and "Lumnite" are registered trademarks.

**Universal Atlas Cement
Division of
United States Steel**

OFFICES: Albany . Birmingham . Boston . Chicago . Dayton . Kansas City . Milwaukee . Minneapolis . New York . Philadelphia . Pittsburgh . St. Louis . Waco

CINCINNATI

Courtesy Bannock Steel Company

Maintenance negligible

ON 6 YEAR OLD CINCINNATI® SHEAR

"We have had this Cincinnati Shear in almost constant operation for something over six years," says S. L. Cate of Bannock Steel Company, Pocatello, Idaho, "and, to date, maintenance costs have been almost negligible. We certainly feel this is truly a remarkable performance."

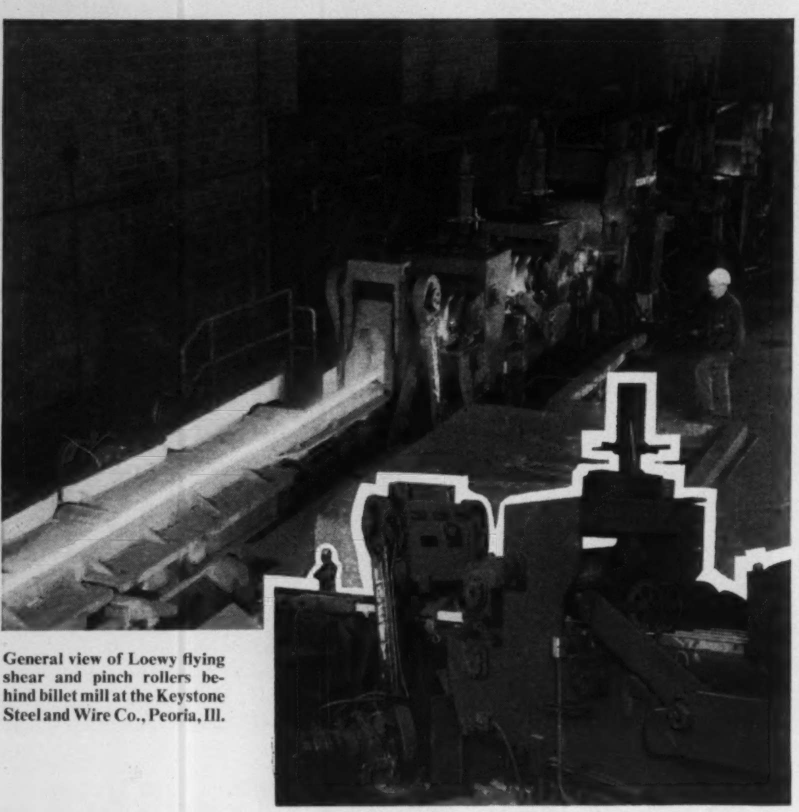
Bannock Steel Company recently installed a new Cincinnati Hydraulic Press Brake—clear evidence of their confidence in the Cincinnati line. See our insert in Sweet's Machine Tool file.

THE CINCINNATI SHAPER CO.

Shapers / Shears / Press Brakes Cincinnati 11, Ohio, U. S. A.

In Scotland: The Cincinnati Shaper Co., Ltd., Glasgow

KINEMATICS--the reason why Loewy flying shears perform with unerring accuracy



General view of Loewy flying shear and pinch rollers behind billet mill at the Keystone Steel and Wire Co., Peoria, Ill.

Close-up of flying shear as viewed from pinch roller side

Billet approaching flying shear

Shear cycle starts

Cutting operation

Cut finished

Installed behind a continuous billet mill, the electrically operated Loewy oscillating flying shear is indeed an extraordinary precision tool. Its speed is synchronized with the speed of the mill. Its adjustability conforms exactly with the material coming from the mill. Sequence of cuts and cut length of material can be changed at will.

The kinematics of the knife blades—a patented feature of Loewy flying shears—is the dominant factor in achieving clean cuts without any distortion of the billet. For each individual cut an automatic oscillating lever mechanism actuates the shear and then returns the blades to their initial position at the end of the cycle.

The flying shear is a part of the complete Loewy billet handling system: skew-roll grouping tables behind the shear, billet cooling beds, and runout tables from where the material is selectively kicked off into collecting pockets. The shear itself can, of course, be furnished for an already existing system.

All B-L-H machinery is designed and built to our customers' requirements. B-L-H's Industrial Equipment Division builds Loewy rolling mills and auxiliary equipment, as well as Loewy hydraulic machinery. To avail yourself of our services, write Dept. B-9.

Visit us at Booth No. 504, AISE Show
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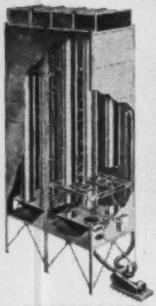
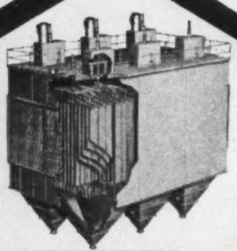
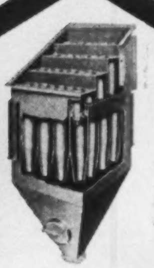


JET-CLEANED FILTER
("Dualaire")

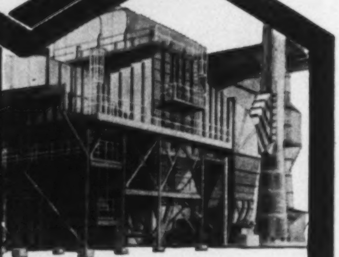


PRECIPITATOR
("Cottrell" Electrostatic)

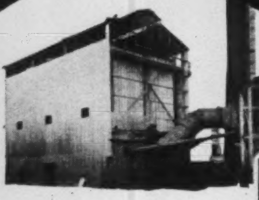


CYCLONE
("Multiclone" Collector)

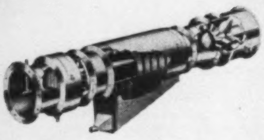
In Air Pollution Control...
There's Only 1 With All 7!



COMBINATION
(Cottrell-Multiclone "CMP")



HI-TEMP FILTER
("Therm-O-Flex")



JET-WHIRL SCRUBBER
("Joy Microdyne")

DEEP-BATH SCRUBBER
("Turbulaire-Doyle")

HOW WESTERN PRECIPITATION'S UNIQUE "KNOW-HOW" BENEFITS YOU!

The science of dust, fume and fly ash recovery is a highly technical one. Moreover, the fact that there are a number of basic methods for separating suspensions from industrial gas streams – each with certain advantages and disadvantages – further complicates the basic problem.

Even two different plants cleaning the same type of gas may find that such variables as capital investment policies, maintenance and labor schedules, and other similar management functions may make one type of equipment the logical choice for one plant – a basically different type of equipment the best solution for the other.

That's why Western Precipitation's position in the gas cleaning field is so unique. It is the *only* organization that designs, engineers and installs *all* the basic types of gas-cleaning equipment. It is completely unbiased in its viewpoint, and is able to show you exactly how the overall costs, the collection efficiencies and the operating requirements will vary for each installation – with each type of collecting equipment that may be applicable.

Such an unbiased evaluation is invaluable in assuring optimum returns from your gas-cleaning dollar. Best of all, this unique "know-how" costs you nothing. It is a basic part of Western Precipitation's service to industry throughout the United States, Canada and the Free World.

Our nearest representative will gladly place this unique fund of experience at your service. Why not call him today?

G-190

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Cottrell Precipitators	Multiclone Dust Collectors	Therm-O-Flex Hi-Temp Filters	Dualaire Reverse-Jet Filters	Turbulaire-Doyle Scrubbers	Joy Microdyne Scrubbers	Combination Units	Holo-Flite Processors	Hi-Turbiant Heaters

ANOTHER NORTON PRODUCT

Why

switch to resin-bonded belts?

You have at least two good reasons for switching to Behr-Manning resin-bonded abrasive belts:

1. They give you the benefit of cooler cutting through heat resistance in every step from roughing thru polishing, with minimum loading or shedding.

2. They give you the advantage of lasting much longer than glue-bond belts, easily justifying by production savings, their slightly higher initial cost.

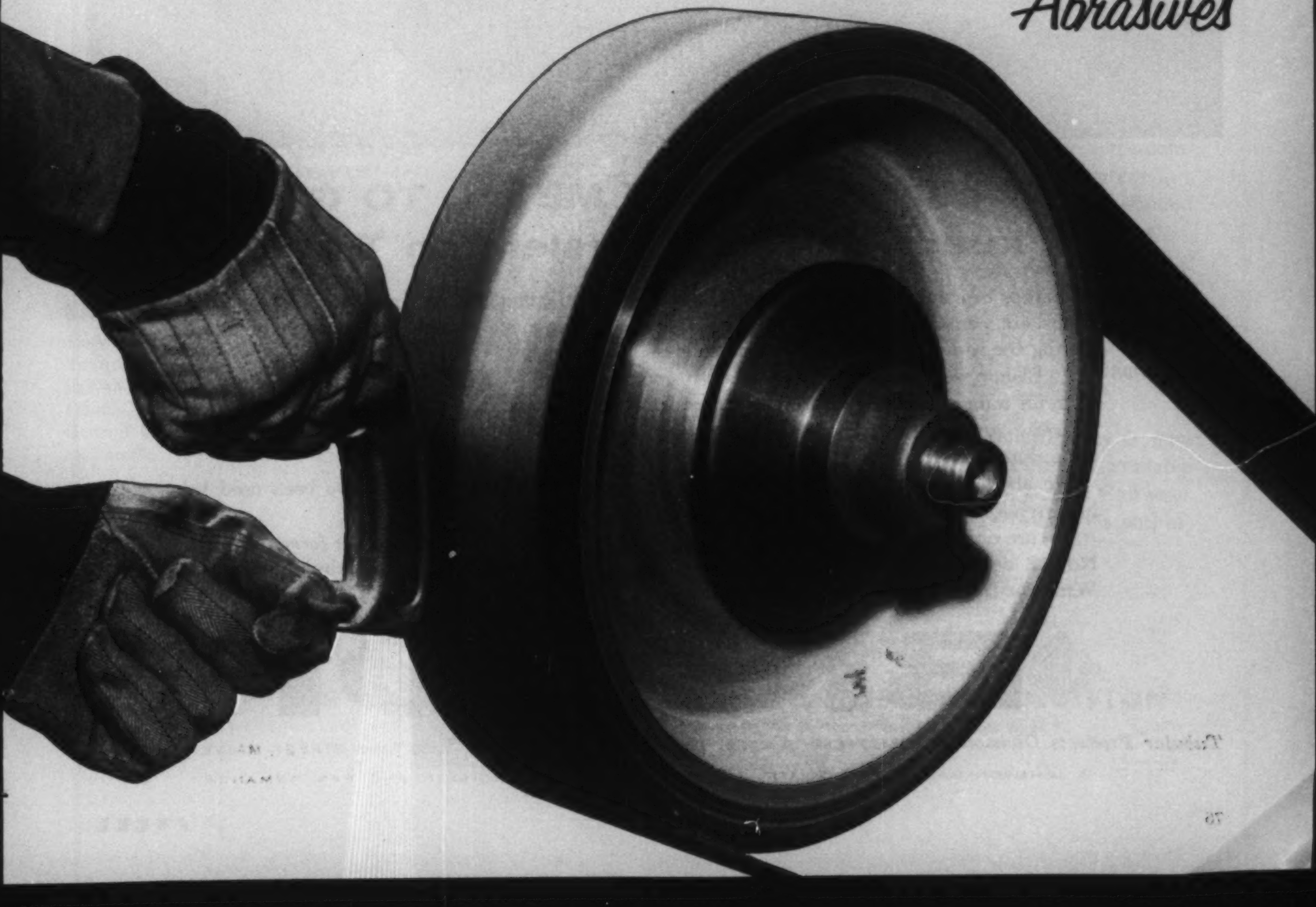
There are two principal types of Behr-Manning resin-bonded abrasive belts:

RESINALL® . . . an all resin-bonded, aggressive belt of strong X-weight cloth, for maximum heat resistance in most all rough and intermediate grinding.

RESINIZED® . . . a resin-over-glue belt of good heat resistance, in strong X-weight for flat polishing, and in flexible J-weight for contour polishing.

Prove the advantages yourself. Ask for an in-plant test. Write Dept. S-9, BEHR-MANNING Co., Troy, N. Y., a division of Norton Company.

BEAR
BRAND
Abrasives



PERFECT SEALS OF METAL TO GLASS
keep this Radar System on Track

Hundreds of components in this radar system—tubes, connectors, thermal relays, transistor stems, etc. contain seals of metal to glass. These seals are made possible by special metal alloys having the same expansion coefficient as glass.

At Bishop we have been making glass-to-metal sealing alloys in tubular and composite wire form for many years. In addition, we produce stainless steel and nickel tubing in mechanical, aircraft, capillary and hypodermic grades in sizes up to 1 inch OD—plus an amazing variety of "specialties" such as clad metals, super and "exotic" alloys.

We also produce a vast line of platinum products and chemicals that have been used by industry for over a century.

We are unique because of our ability to *work these metals to such tiny, precise forms.* Bulletin No. 12 describes our tubular products—Catalog No. 5 describes our platinum products. Write for them.

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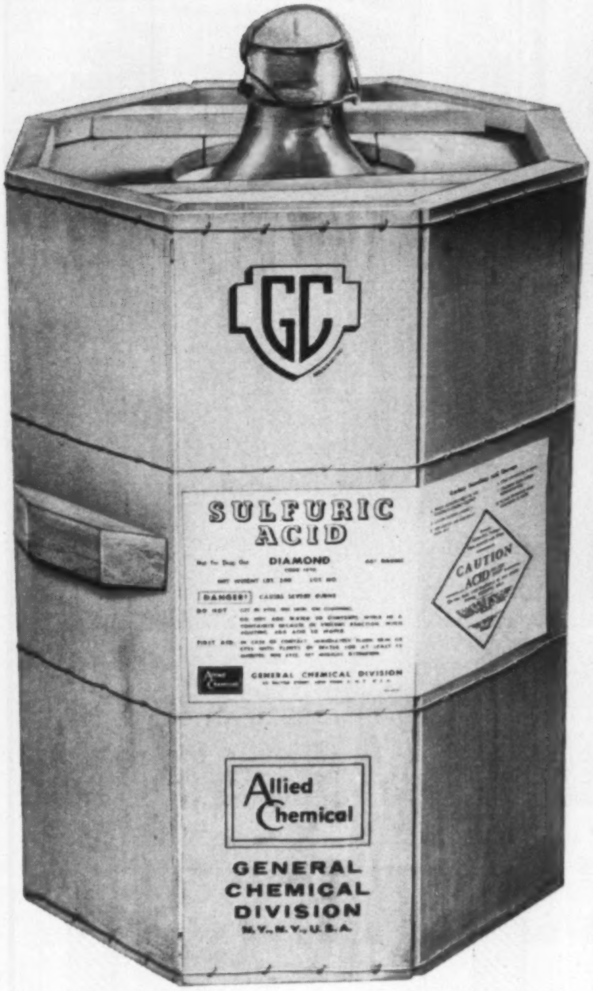
A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"

Coming soon from General Chemical!



NEW, Safer, Lighter, Smaller 13-Gallon Acid Carboy

cushioned with *expanded polystyrene* overpack

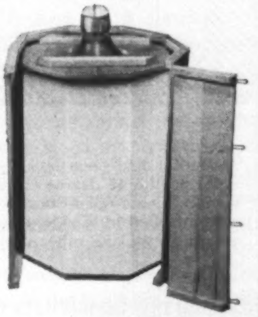
General Chemical packaging research has done it again! This time with a new carboy for 13-gallon acid bottles that has just won the 1960 "Best of Show" award from the Society of Packaging and Handling Engineers. Here is a commercial acid carboy that cushions the bottle completely with foamed-in-place *expanded polystyrene* . . . also has the added protection of an octagonal wire–bound wooden shell. Look at these outstanding advantages:

- ✓ **Safer!** New *expanded polystyrene* overpack resists shock . . . cushions bottle in shipping and handling.
- ✓ **Lighter!** 40% less tare weight.
- ✓ **Smaller!** Increases shipping and storage capacity by 30-35%.

This revolutionary new 13-gallon acid carboy is now going into expanded production and will be available soon from most production and stock points. Call your nearest General Chemical office for full details and information on availability in your area.

New Acid-Bottle Protection

Underneath the rugged, wire-bound wooden outer shell, inch-thick, foamed-in-place *expanded polystyrene* protects General Chemical's 13-gallon acid bottle.



Basic to America's Progress

Allied Chemical

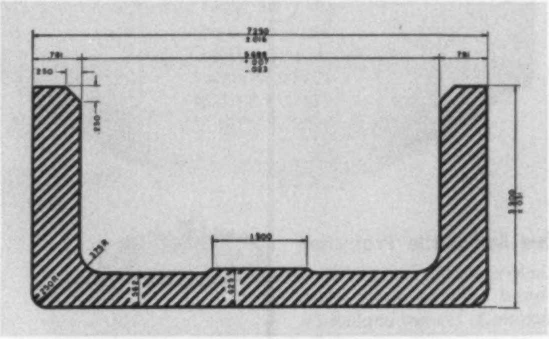
GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N.Y.

CONNORS special sections at Towmotor...

TOWMOTOR
TOWMOTOR
TOWMOTOR
TOW

"We increased our production efficiency 25% with Connors Special Sections," says Mr. Richard S. Wentz, Vice President, Towmotor Corporation

"By working with Connors Special Sections Engineers, we have gone a long way in improvements in product design and styling," Mr. Wentz says. "The flexibility of the Connors mill has enabled our engineers to design sections which in the past were considered impractical from a mill standpoint, yet highly desirable to our engineering and production departments."



Towmotor had been machining the height, the inside face and the 45 degree chamfer on their mast channel section. These operations were eliminated by a special section rolled by Connors providing the dimensions required as well as other desirable features.

***Let** Connors Special Sections work for you.*

For illustrated brochure or consultation write or call Connors — Specialists in Special Sections

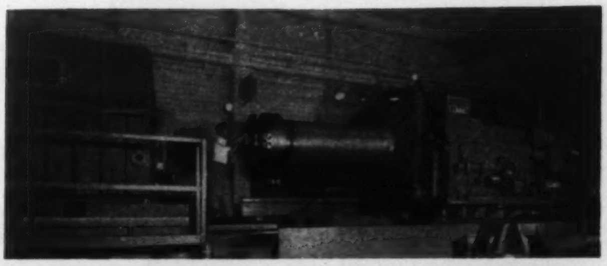
CONNORS STEEL DIVISION, P. O. BOX 118A, HUNTINGTON, WEST VIRGINIA • PHONE JAckson 9-7171

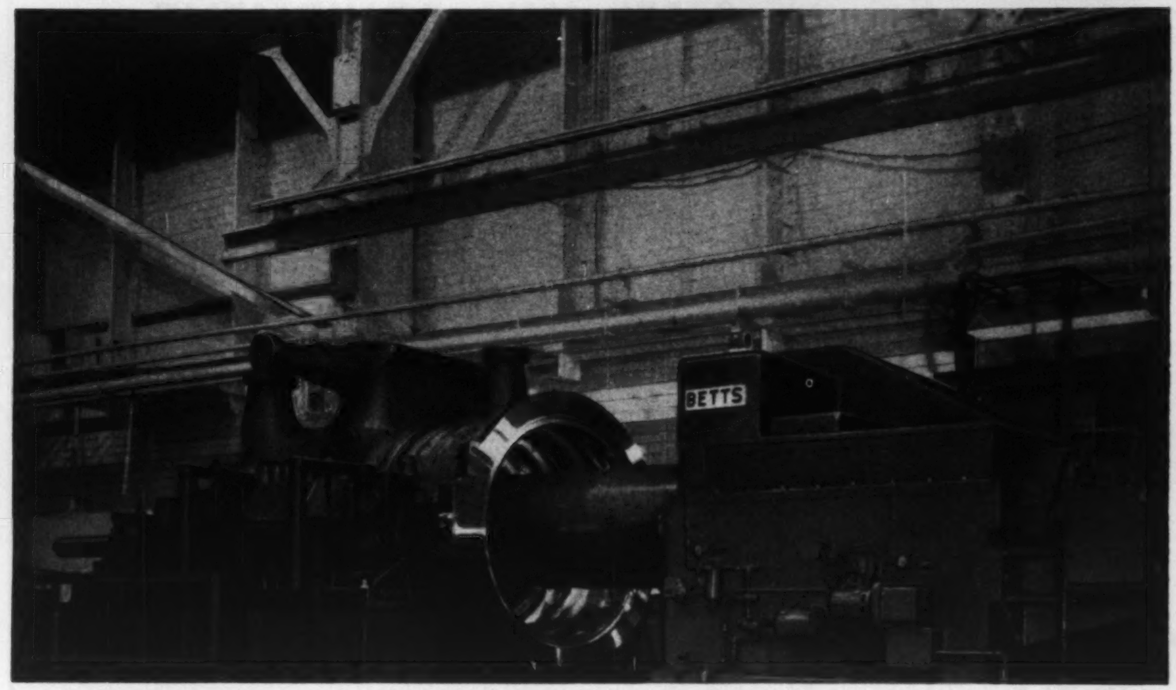
CONNORS STEEL DIVISION PORTER ***H.K. PORTER COMPANY, INC.***

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

Right: Setting tools on 42″ diameter boring head of the new Farrel-Betts machine at the Lynn plant of G.E. Workpiece is a fabricated casing for a 12,500-hp turbine.

Below: Finish boring, facing and grooving the cast-steel, high-pressure head for a 100,000-kva turbine. All operations are done in one setup. Casing is 7-feet in diameter and 12-feet long.





Horizontal boring of turbine casings cuts floor-to-floor time in half

Until recently, General Electric Company machined turbine casings on a vertical boring mill, with the work supported on end, rotating around a stationary cutting tool. With the installation of a Farrel-Betts horizontal boring machine, G.E. has improved its machining efficiency . . . has reduced by 50% the floor-to-floor manufacturing cycle time. Accuracy is higher, too, since machined dimensions are produced by the machine's control system.

The 250-ton mill is powered by ten motors ranging from 10 to 200 horsepower. Carbide tools revolve inside the workpiece at optimum cutting speeds. In contrast with the slow machining speeds of the vertical mills, this new machine is operating at 400 sfpm with accuracy within .001″. The control system is completely automatic and designed so that it can be set up for punched-card or tape control.

For further details, write for a copy of Bulletin 92-C-601.

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CONSOLIDATED MACHINE TOOL DIVISION
568 Blossom Road, Rochester 10, N. Y.
Telephone: BUtler 8-4600
Plants: Ansonia and Derby, Conn.,
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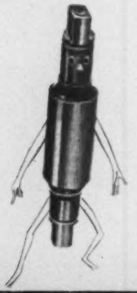
BETTS

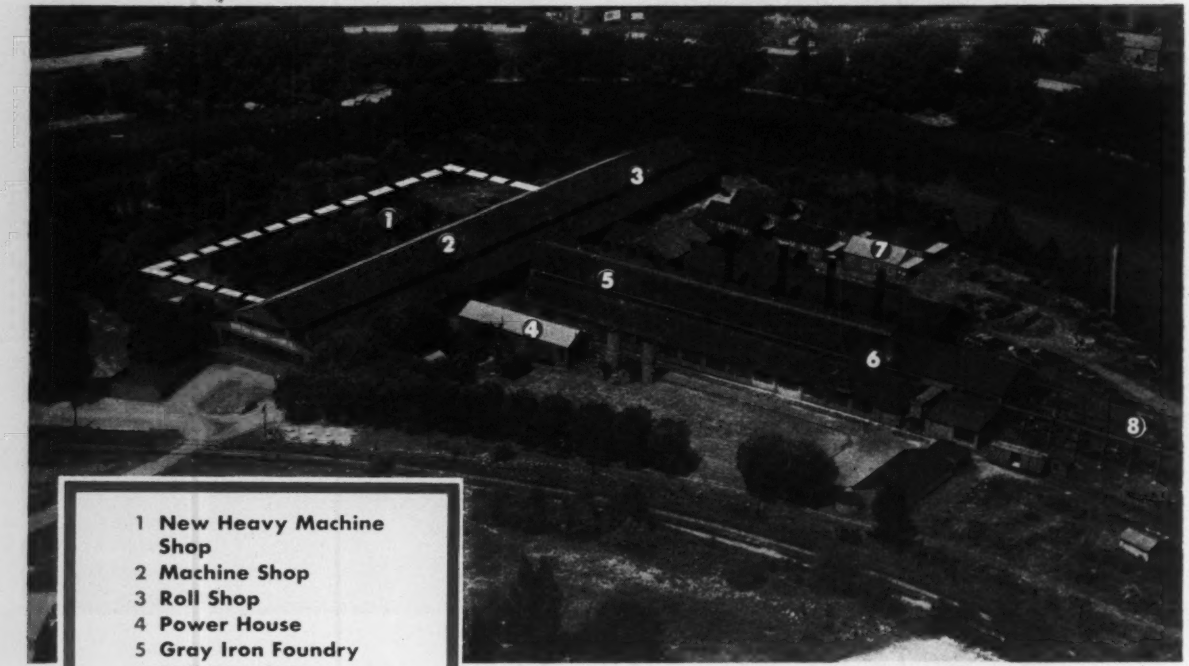
CONSOLIDATED ALSO BUILDS Engine Lathes • Roll Lathes • Vertical Boring and Turning Mills • Floor and Planer-type Horizontals • Planers, Double Housing and Openside • Planer-type Milling Machines • Plate-edge Planers and Millers • Vertical Slotters • Rotary and Straightline Production-type Milling Machines • Skin Mills and Cavity Mills for Aircraft Manufacturing • Circular Cold Saws • Railroad Wheel and Axle Machinery • Drill Grinders • Special Machine Tools

CM-57



Hyde Park

Adds Facilities for LARGER and HEAVIER STEEL MILL EQUIPMENT



1. **New Heavy Machine Shop**
2. **Machine Shop**
3. **Roll Shop**
4. **Power House**
5. **Gray Iron Foundry**
6. **Roll Foundry**
7. **Pattern Storage**
8. **Scrap Yard**

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Nickel Alloy Grain Rolls
Grain Rolls
Chilled Rolls
Nickel Chilled Rolls
Moly Rolls
Nodular Iron Rolls
All Grades Nickel Alloy Iron Rolls for Hot and Cold Rolling

ROLLING MILL EQUIPMENT

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Merchant Mills
Roller Tables
Stretcher Levellers
Sheet Mill Shears
Special Machinery
Sheet and Strip Mills
Pinion Stands
Reduction Drives
Roll Lathes
Machine Work

CASTINGS

Furnace Castings
Heavy Die Castings
Bases
Housings
Machinery Castings
Slag Pots
Heavy Tool Castings
Floor Plates

A new Heavy Machine Shop Building with 27,000 square feet is being built to augment erection and heavy tool facilities.

The main bay will have a 60 foot center aisle with capacity for 75 Ton Cranes.

Now, with expanded erection and engineering facilities, Hyde Park welcomes the opportunity to work with you on any of your equipment requirements.

SEE US AT THE Iron & Steel EXPOSITION SEPT. 27, 28, 29, 30 CLEVELAND, OHIO

Booth 470

Hyde Park

RED CIRCLE Rolls ALLOY-CHILLED

The Mark of Quality

Foundry and Machine Company

HYDE PARK, WESTMORELAND COUNTY, PITTSBURGH DISTRICT, PA.

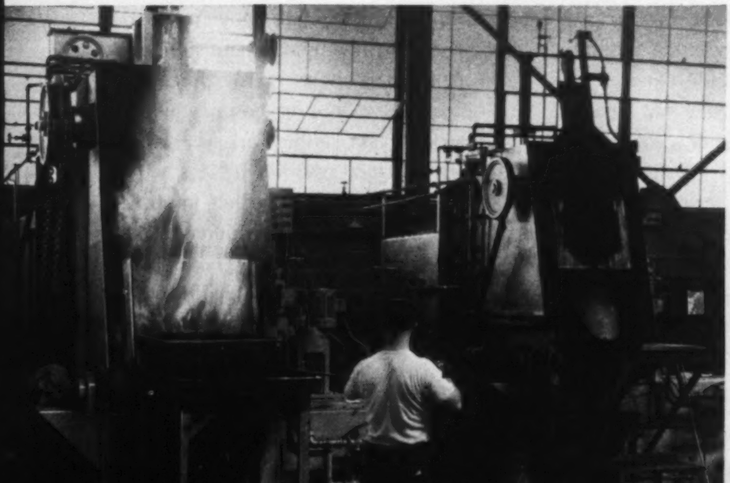
What HORACE DREVER has to say about Lindberg heat treating equipment

QUOTE from Mr. Drever's unsolicited letter to Lindberg Engineering Company

Mr. Horace Drever, internationally prominent in the industrial heating field, is a Past-President of the Furnace Manufacturers Association and President of Drever Company, furnace manufacturers and commercial heat treaters.

"For the past three and one-half years, we have been operating one of your Type 243618 GVRT Furnaces along with a 500 CFH Lindberg Hyen generator in our commercial heat treating division. We are extremely pleased, not only with the fine quality of work turned out by this equipment but also its relatively trouble-free operation. As evidence of our complete satisfaction we have ordered another Lindberg Furnace of this type."

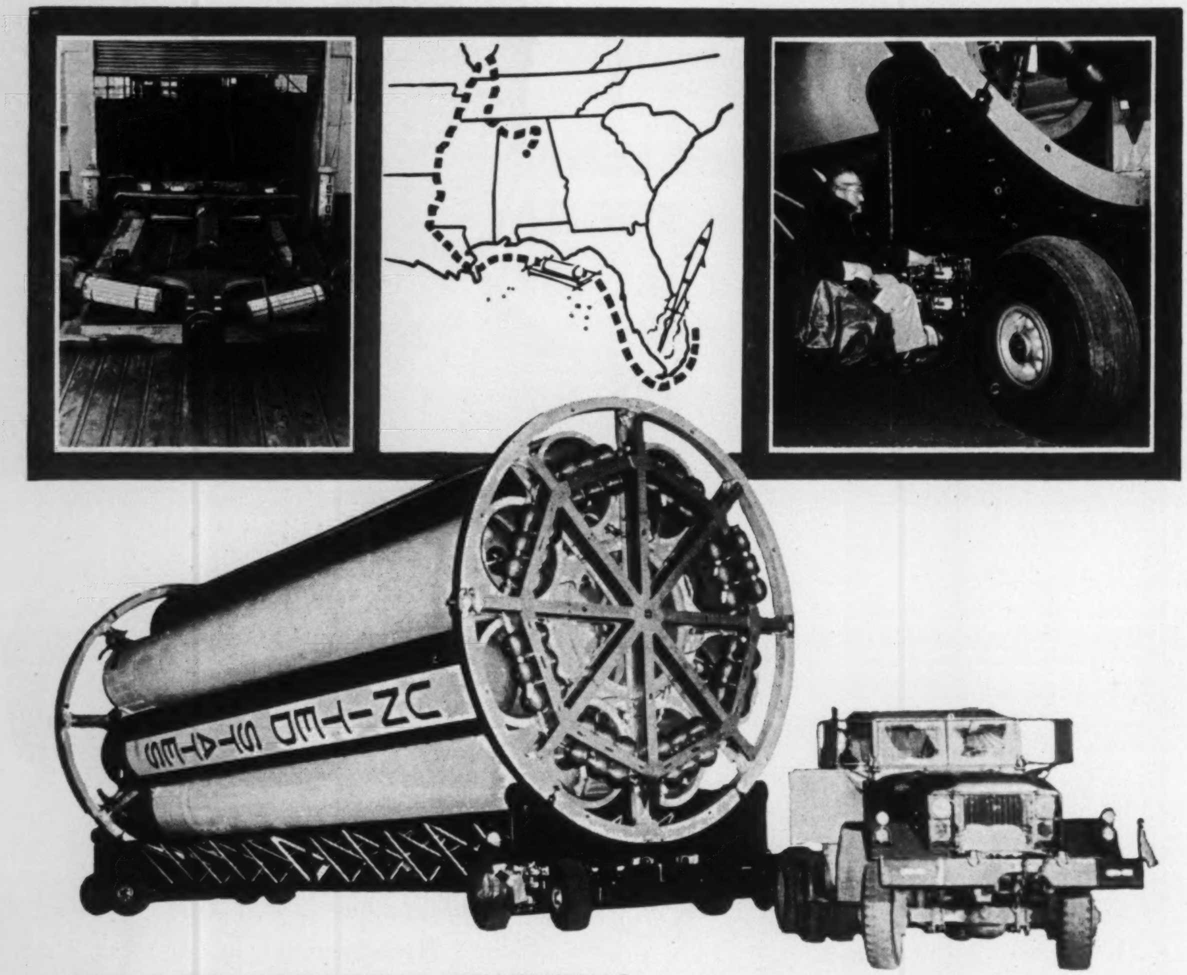
DREVER COMPANY



Lindberg Furnaces in operation at the Drever Company, Bethayres, Pennsylvania.

We are happy that Mr. Drever, a furnace manufacturer in his own right, originally chose Lindberg equipment for his heat treating plant and that its satisfactory service prompted an additional order. The second Lindberg Furnace is now in production at Drever Company, as the adjacent photo shows. Bless those satisfied customers! If you have a product or process in the metal or ceramic field requiring the application of heat you can depend on Lindberg's engineering and design know-how to provide exactly the right equipment to answer your need. Get in touch with your nearest Lindberg Field Representative (see classified phone book) or write direct to Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois. Los Angeles plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

LINDBERG
heat for industry



GIANT TRANSPORTER FEATURING ACIPCO "WALKING BEAM ASSEMBLIES" WILL HELP...

Saturn's conquest of space

The moment draws near when America's Saturn rocket will thunder into space. But in the meantime, elaborate ground preparations are now taking place.

From the N.A.S.A. Marshall Space Flight Center in Huntsville, Alabama, via a circuitous land and water route to the launching site, the missile and its valuable cargo will be gently cradled on the huge transporter shown here. Acipco walking beam assemblies (upper left) are vital parts of this transporter.

These rugged assemblies are constructed of high strength alloy steel and comprise centrifugally spun and statically cast component parts . . . all produced at Acipco. Also, all precision machining and intricate fabrication work were done by skilled Acipco personnel.

While your tubular product application may not be destined for outer space, Acipco's production "know how" and complete "under one roof" facilities can assist you, too. Your inquiry is invited.

ACIPCO
SPECIAL PRODUCTS
DIVISION OF ACIPCO AMERICAN CAST IRON PIPE CO.
BIRMINGHAM 2, ALABAMA

General Electric's outstanding service organization helps keep your furnaces on the line, producing at a profit.

HEAT
from General Electric

How General Electric service after start-up saves you heat processing dollars

High temperatures and high stresses used in heat processing can cause fatigue and wear in furnace parts. When need for replacement of these parts stops production, you can't take chances. You need fast, efficient service to get the lines moving again, with minimum downtime.

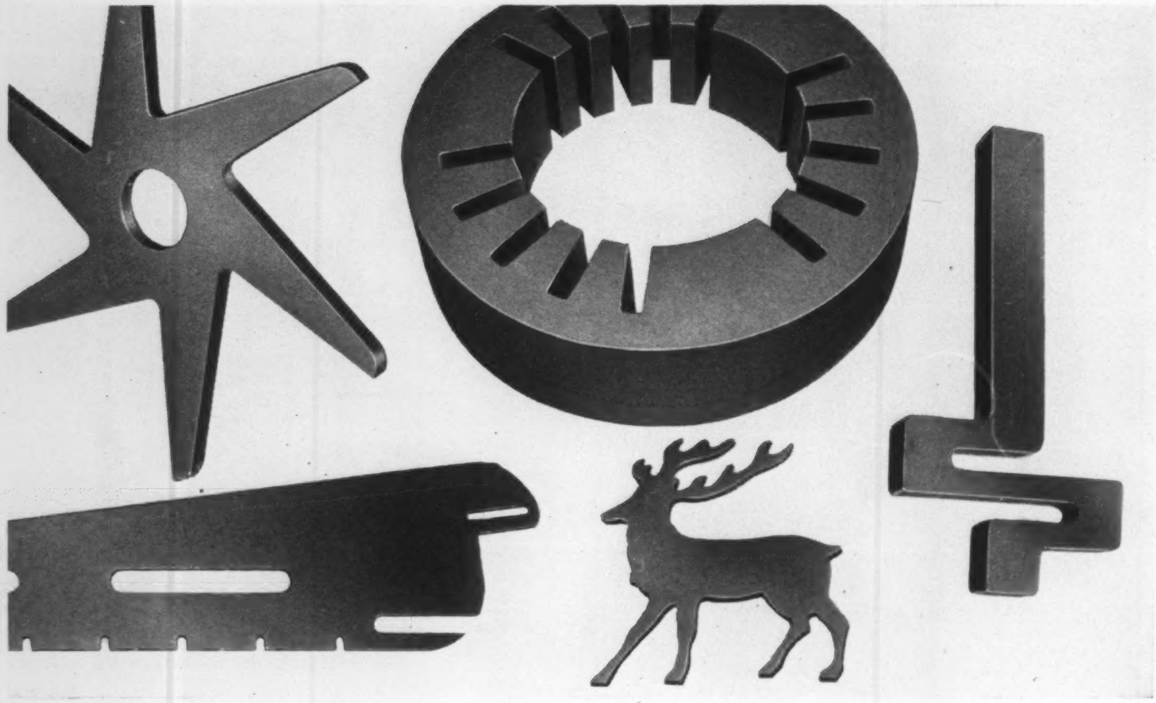
General Electric is always ready to provide just this kind of service after start-up. Your G-E heating specialist, district field engineers, nearby service shops, and a fast-moving renewal parts organization are all quickly available to help when you have a planned repair program or emergency breakdown.

Example: General Electric helped plan the rebuilding of high-temperature copper brazing equipment for an Ohio customer. G.E. provided new brickwork, heating elements, hearth material, and supervised installation. This planned maintenance helped complete the job with minimum interruption to production.

Example: Rolls of a sintering furnace failed due to over-temperature operation. General Electric installed all new rolls in less than three weeks.

Make sure the furnaces you buy or specify are backed up by service that keeps your heat treating line at its profitable best. Contact your nearby General Electric Apparatus Sales Office for "added value" on your next furnace installation. 721-35

GENERAL ELECTRIC



What's the lowest cost way to produce steel parts like these?

No matter what size the part, or how intricate, Ryerson flame-cutting service may save you money over cast or forged parts. And you get quick delivery of one part or a thousand, cut to close tolerance—with almost die-cut accuracy.

Save 6 ways:

1. No dies or molds needed.
2. Less machining required to finish—sometimes none.
3. Lower freight costs—you don't pay shipping on material you later scrap.
4. Less time in process—convert products into cash quicker.
5. No loss on rejects.
6. Design changes are simpler, less expensive.

A blueprint or sketch with clearly marked dimensions is all we need for prompt handling of your flame-cutting requirements. Heliarc cutting of stainless also available on request. Call your nearby Ryerson plant for cost-cutting, flame-cut steel today.

Steel

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Nation's broadest selection of types and sizes

CARBON STEEL

Forming and Welding Quality
ASTM A-7
E-Z-Cut® 20 & 20L
.40/.50 Carbon
High-Strength Low-Alloy
Flange & Firebox
Abrasion Resisting
Jalloy 360
4-Way® Safety Plate

ALLOY STEEL

8620 & E8615
4130 & 4140
T-1 (Firebox & 321 BHN)
Type 502
A.Q. 4130 & E4130

STAINLESS STEEL

Types 302, 304, 304L, 309, 310, 316, 316L, 321, 347, 410

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RYERSON PLUS VALUES

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STEEL
The Metalworking Weekly

Metalworking Week®

September 19, 1960

How Second Quarter Sales, Profits Stacked Up

The Securities & Exchange Commission and the Federal Trade Commission report second quarter sales and profits of U. S. manufacturing corporations (figures are percentage changes in 1960's second quarter vs. 1959's second quarter) . . .

	Sales	Net Profits		Sales	Net Profits
All manufacturing	*	−16%	Metalworking machinery.	+16%	−26%
Durable goods	−2%	−22%	Primary iron & steel ...	−28%	−52%
Motor vehicles & equipment	+1%	−15%	Primary nonferrous	−6%	−19%
Aircraft & parts	+4%	−17%	Instruments, related products	+12%	+14%
Electrical equipment ...	+8%	−12%	Fabricated metal products	*	−25%

*Decline of less than 1 per cent.

Diecasters See Respectable Year

Members of the American Die Casting Institute, holding their annual meeting in Chicago, predict that 1960 production of zinc diecastings will reach 335,000 tons (exceeding 1959 levels by 10,000 tons) and aluminum diecasting output will reach a record 387 million lb (topping the '59 mark by 12 million lb). ADCI also looks for record production in 1961. Gordon C. Curry, vice president, Dollin Corp., Irvington, N. J., was re-elected president of the ADCI.

Material Handling Equipment Sales to Climb

Material handling equipment builders will have a better year in 1961, C. L. Fell, president, Material Handling Institute, and vice president-marketing, American Monorail Co., told Steel at MHI's fall meeting. He thinks the big push will come in 1961's second quarter and that it will continue through the year. Price cutting still plagues the industry, but Mr. Fell expects prices to firm later this year. He terms 1960 business "disappointing."

PAs Report Poor Showing in August

The August survey of the Purchasing Agents Association of Chicago finds: Inventories were still being cut back . . . employment declined . . . prices were stable . . . production dropped . . . new order volume continued steady at an unexciting level . . . profit margins were narrowing . . . 7 out of 10 PAs said they were buying hand to mouth.

Steel Imports Drop in July; So Do Exports

Imports of steel mill products in July fell to 177,000 tons—down 36,000 tons from June and 253,000 tons below the strike-inflated rate of July, 1959. The import tonnage was the lowest recorded for any month since November, 1958. But for the first seven months of this year, imports total 2.4 million tons—52,000

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tons above the total for 1959's like period. Exports in July dropped 51,000 tons below the June rate to 331,000 tons, but that represents the second highest monthly total since December, 1957. Commerce Department officials expect steel exports this year to be the highest since 1957.

It's What's Up in the Sky that Counts

You don't buy fuel if you use the latest cigaret lighter. But you'll need the conventional variety after sundown. The new lighter—a solar job—was invented by John G. Thew, Westport, Conn. Made of highly polished aluminum supplied by Alcoa, it's available in two sizes: The large, round model ($2) lights your cigaret in 5 seconds; the smaller, oval job ($1) takes 10 seconds.

Rail Labor Peace Coming

As STEEL went to press, negotiators for U. S. Steel Corp. and the striking Brotherhood of Railroad Trainmen were hopeful of an early settlement of the walkout which began Sept. 2. Pennsylvania Railroad trains were rolling after an 11 day walkout by members of the Transport Workers Union. The Pennsy settlement is estimated to cost under $1 million annually.

Alcoa Bids to Obsolete the Can Opener

Just pull . . . zip . . . and the top is off. That's the principle of a new aluminum can unveiled by Aluminum Co. of America and United Shoe Machinery Corp. It is being tested by Minute Maid. An aluminum tab, welded to the can end, is used to pull off the top. T. D. Welch, assistant general manager of United Shoe, says the development opens the way for cans to be used in automatic vending machines. The top is making its debut on a new type of can body—aluminum foil laminated to paperboard.

Economists Want Depreciation Reform

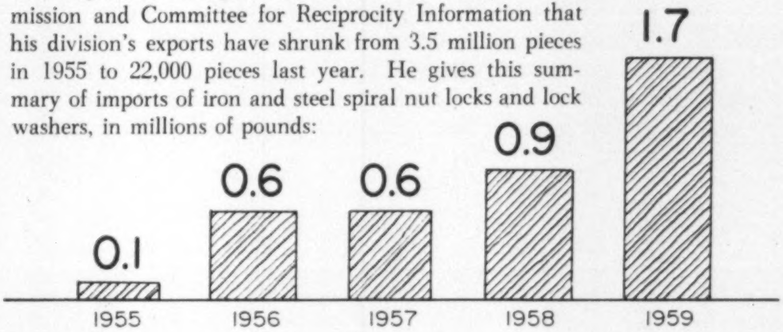
Seven of every nine business and labor economists polled by the American Economic Foundation want liberalized depreciation allowances. The Foundation estimates that an increase of $5 billion to $7 billion a year in depreciation allowances is needed to close the gap between the current flow and the amount needed to finance capital expenditures.

Everybody Does Business with 'Marginal' Accounts

One of every four U. S. companies gets 20 per cent or more of its business from "marginal" accounts—and no company claims to get its entire sales volume from foolproof credit risks. So finds a survey by National Association of Credit Management. One of every three companies says it gets 11 to 20 per cent of its business from the marginal group.

Will U.S. Lose Another Industry?

Foreign competition is putting a large enough dent in sales of the lock washer industry that observers are beginning to wonder whether it too will go the way of the sewing machine, typewriter, and other industries where nearly all of the U. S. companies have been forced out of business. Paul A. Miller, general manager, Eaton Mfg. Co.'s Reliance Div., told the Tariff Commission and Committee for Reciprocity Information that his division's exports have shrunk from 3.5 million pieces in 1955 to 22,000 pieces last year. He gives this summary of imports of iron and steel spiral nut locks and lock washers, in millions of pounds:



Consumer Debt May Double in Decade

Consumer debt for cars, appliances, and other durable goods may double in the '60s, predicts James C. T. Mao of the University of Michigan. He says total consumer installment credit may pass the $80 billion mark by 1970 (vs. about $40 billion today). He says about one-fourth of the increase will be used to finance car purchases. He says debt will continue to rise faster than disposable income.

Boating: It Leaves Other Fast Growing Industries in Its Wake

Retail purchases of boating equipment and services have nearly quadrupled in the last ten years. About $2.5 billion were spent last year, the Outboard Boating Club of America reports. The '59 figure was 19 per cent greater than that for 1958. Boatmakers consumed 165 million sq ft of sheet marine plywood, 50 million lb of aluminum, and 75 million lb of glass fibers. An estimated 39 million persons use the country's 8 million pleasure boats, says the boating club. The trend is to more power, with almost half the 1959 sales of outboard motors in the 20 hp and over class.

Transit Firm Will Build Own Buses

Niagara Frontier Transit, Buffalo, N. Y., plans to build its own buses to incorporate in the design "the things that bus manufacturers have failed to see." The firm plans to turn out one new bus a week. Company president R. F. Thoma says the firm was encouraged to enter the bus business by the success of its first manufacturing venture—the production of miniature trackless trains used for sight-seeing around Niagara Falls.

Robot Salesmen Tackle New Products

With the number of automatic vending machines in service now around 4 million, makers of the robots are looking for new chores to boost their volume even higher. Likely markets: In-plant feeding, drugstores, drive-in movies, sporting events, airports, bowling alleys, sections of department stores. About 100 companies make the machines; they shipped $128.1 million worth last year. The robots sold $2.3 billion worth of goods in '59.

Who Makes the Most Money?

Income of U. S. individuals last year reached a record $380.66 billion—up 6.5 per cent from the 1958 peak, the Commerce Department reports. With consumer prices up only about 1 per cent, practically all of the gain was real. Here's a breakdown by states (first figure is 1959 per capita income, second is percentage increase from 1958):

Delaware	$2,946	3.2%	Alaska	$2,550	2.6%
District of Columbia	2,943	3.3	Massachusetts	2,444	4.7
Connecticut	2,817	3.7	Maryland	2,343	4.2
Nevada	2,745	6.6	Ohio	2,328	5.5
New York	2,736	5.8	Washington	2,271	4.5
California	2,661	6.7	Michigan	2,253	4.0
Illinois	2,610	4.4	Pennsylvania	2,222	3.7
New Jersey	2,608	4.5	Arkansas*	1,322	10.2

*Lowest per capita income and largest percentage increase.

Straws in the Wind

Unemployment dropped by 200,000 in August (to 3.8 million), largely due to the opening of school, and employment declined by 400,000 (to 68.3 million), mostly due to a seasonal reduction in the farm sector . . . The National Safety Council reports that U. S. Steel Corp.'s Gary Works was the safest big steel mill in the country during 1960's first half . . . Industrial investment projects in metropolitan Chicago during August totaled $15.6 million (vs. $12.1 million in August, 1959), says Chicago Association of Commerce & Industry . . . Jones & Laughlin Steel Corp. has begun an executive study program tailored to solving problems in stainless steel distribution from service centers . . . If the Interstate Commerce Commission approves, Chicago & Northwestern Railway will reduce its rate for hauling iron ore from the Gogebic Range in Upper Michigan to Granite City, Ill., from $4.55 a gross ton to $4 . . . Color television has become a $100 million a year business, John L. Burns, president, Radio Corp. of America, reports. It reached the figure in just six years.

Metalworking Pulse

The Business Trend: With reactivation of the auto industry and a moderate improvement in steelmaking, the loss of 10 points in STEEL's index resulting from the Labor Day holiday should be regained in a week or two. **Autos:** Production schedules have been set back by dull sales and railroad strikes. But most builders are now assembling '61s. **Steel:** Upturn in the ingot rate also has been slowed by the rail strikes.

- **INDUSTRIAL PRODUCTION**
  Week ended Sept. 10 . . . **137†**
  Year ago **103**
  Details on Page 115
- **PASSENGER CAR PRODUCTION**
  Week ended Sept. 17 . . **70,000***
  Year ago **62,716**
  Details on Page 112
- **INGOT PRODUCTION RATE**
  Week ended Sept. 18 . **52.7%†**
  Week ago **49.2%**
  Details on Page 207

†Preliminary. *Estimated.

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NEED TUBING?

Specify TAILORED TUBING!

Made by a specialty mill with 33 years' experience tailoring quality seamless steel tubing to meet the most rigid specifications!

PRESSURE TUBING

TAILORED TUBING for continuous service under high pressures and temperatures.

Specifications:

ASTM	Grade	Analysis
A-53		Carbon steel
A-106		Medium carbon steel
A-333	C	1022 steel
	3	2315
	5	2512
A-335	P1	Carbon, ½% Moly.
	P2	½% Chrome, ½% Moly.
	P3	1¼% Chrome, ¾% Moly.
	P3b	2% Chrome, ½% Moly.
	P5	5% Chrome, ½% Moly.
	P5c	5% Chrome, ½% Moly. with Titanium
	P7	7% Chrome, ½% Moly.
	P9	9% Chrome, 1% Moly.
	P11	1¼% Chrome, ½% Moly.
	P12	1% Chrome, ½% Moly.
	P21	3% Chrome, 1% Moly.
	P22	2¼% Chrome, 1% Moly.

Sizes: 3⁄16" to 3" O.D., including standard I.P.S. sizes ⅛", to 2½" inclusive.

Wall thicknesses in an extra wide range, including Schedules: 40, 80, 160 Cold Drawn, and Hot Finished, Seamless pipe.

MECHANICAL TUBING

Machining parts with a hole? Use TAILORED TUBING to simplify fabrication, save time and material.

Available in many shapes (square, hexagonal, etc.) with O.D. from 3⁄16" to 3½".

Carbon Steel: Standard A.I.S.I. from grade designation C-1008 to C-1070 inclusive.

Alloy Steels: including all A.I.S.I. Open Hearth and Electric Furnace Steels; Haynes Alloy 25, Hastelloy C, X, R 235 and Multimet. But not including stainless, and E-50100, E-51100 and 9200 series.

Resulphurized Steel: In grades C-1118, C-1137 and C-1141.

Can be furnished cold drawn, normalized or any special anneals. Our superior annealing equipment assures meeting specifications with absolute minimum decarburization.

OIL-COUNTRY TUBING

Highest quality TAILORED TUBING for maximum dependability and outstanding service.

Grades: J-55, N-80, P-105 and higher.

Sizes: All the macaroni sizes, ¾", 1", 1¼", 1½", and 2" I.P.S.

Lengths: All standard length Ranges.

Facilities to full length normalize and straighten.

AIRCRAFT TUBING

This sturdy TAILORED TUBING is supplied in round, oval, square, rectangular and other shapes to your specifications.

Specification	Analysis	
MIL-T-5066	1025	Steel
MIL-T-6732	8630	
MIL-T-6733	8735	
MIL-T-6735	4135	
MIL-T-6736	4130	
AMS-5050	1010	
AMS-5075	1025	
AMS-6360	4130	Magnaflux Quality Steel
AMS-6365	4135	
AMS-6530	8630	
AMS-6535	8735	
AMS-6274	8620	
AMS-6281	8630	
AMS-6282	8735	
AMS-6283	8735	Magnaflux Quality Steel
AMS-6323	8740	
AMS-6371	4130	
AMS-6372	4135	
AMS-6381	4140	
AMS-6415	4340	

DECARBURIZATION

With the most versatile annealing and heat treating equipment in use today, Michigan Seamless can supply cold worked, normalized, stress-relieved and soft-annealed tubing for any end use, with decarburization normally less than half allowed by standard specifications.

We will quote and guarantee material to special government specification number MIL-T-6736A insofar as depth of decarburization is concerned.

CONDENSER, HEAT EXCHANGER, AND BOILER TUBES

Now, for the first time plain or integral fin U-tubes from one source! Almost all grades of TAILORED TUBING below are also available as integral fin tube and all can be U-bent to your specifications. Bi-metal tubing also available.

ASTM	Grade	Analysis
A-83		Low carbon steel
A-106		Medium carbon steel
A-161		Low carbon steel
A-179		Low carbon steel *
A-192		Low carbon steel
A-210		Medium carbon steel
A-334	C	1022 Steel*
A-161	T1	Carbon, ½% Moly.
A-199	T3b	2% Chrome, ½% Moly.*
	T4	2½% Chrome, ½% Moly.*
	T5	5% Chrome, ½% Moly.*
	T7	7% Chrome, ½% Moly.
	T9	9% Chrome, 1% Moly.
	T11	1¼% Chrome, ½% Moly.*
	T21	3% Chrome, 1% Moly.
	T22	2¼% Chrome, 1% Moly.*
A-200	T3b	2% Chrome, ½% Moly.
	T4	2½% Chrome, ½% Moly.
	T5	5% Chrome, ½% Moly.
	T7	7% Chrome, ½% Moly.
	T9	9% Chrome, 1% Moly.
	T11	1¼% Chrome, ½% Moly.
	T21	3% Chrome, 1% Moly.
	T22	2¼% Chrome, 1% Moly.
A-209	T1	Carbon, ½% Moly.
	T1a	Carbon, ½% Moly.
	T1b	Carbon, ½% Moly.
A-213	T3b	2% Chrome, ½% Moly.*
	T5	5% Chrome, ½% Moly.*
	T5c	5% Chrome, ½% Moly. with Titanium
	T7	7% Chrome, ½% Moly.
	T9	9% Chrome, 1% Moly.
	T11	1¼% Chrome, ½% Moly.*
	T12	1% Chrome, ½% Moly.*
	T17	1% Chrome Vanadium
	T21	3% Chrome, 1% Moly.
	T22	2¼% Chrome, 1% Moly.*
A-334	3	2315 Steel*
	5	2512 Steel

*Integral fin tube available.

Sizes: 3⁄16" to 3" O. D., with wall thicknesses varying from very light to extra heavy. Integral fin tube available in ⅜" to 1" O. D. inclusive.

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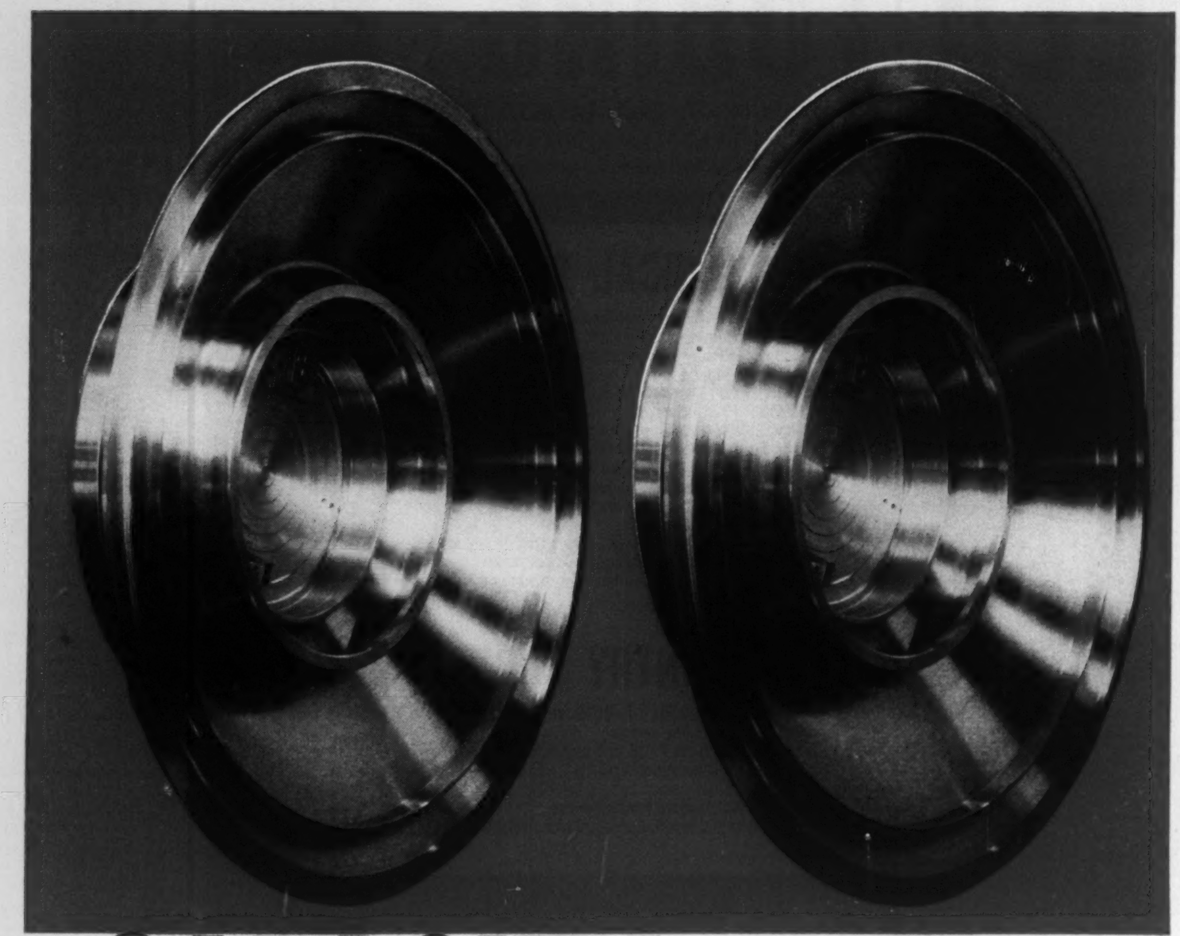
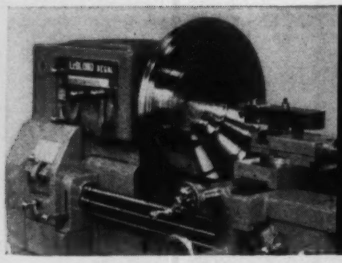


CAPACITY: *Reason enough to buy LeBlond*

These disks are supports for Pratt & Whitney jet engines. Caval Tool & Machine Co., Newington, Conn., took the job off a vertical turret lathe and put it on a LeBlond Regal Plain Bed Gap Lathe. The Regal machines it in 85 per cent of former time. Setup is easier. Tool life increases. The vertical turret lathe is freed for work better suited to it. Pratt & Whitney Aircraft gets its engine supports faster, with finer finish, and to closer tolerance.

Eleven extra inches of swing in this plain bed gap lathe add great versatility to the Regal at small extra cost. Such bargain extra capacity is a powerful incentive to buy a lathe. It's reason enough to buy LeBlond.



THE R. K. LeBLOND MACHINE TOOL COMPANY
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LeBLOND *of Cincinnati*

THE EDITOR'S VIEWS **STEEL**

September 19, 1960

For Paid Engineering!

As evidenced by our correspondence and conversations with top people in industry, the movement to eliminate some of the evils of free engineering is catching on.

But further support is needed. Too many people are content to applaud from the sidelines—even though practically everybody in industry is involved.

Wasted engineering time and talent result when several companies work up expensive proposals on a job with the full knowledge that only one can get the order.

Suppliers who lose out on the order must pass the cost of the waste along to customers they succeed in selling. The alternative is to go into the red.

The problem of equitably distributing engineering costs is not an easy one to solve, especially in this changing era when industry needs more special, creative engineering as part of its drive to reduce costs.

Creative engineering that contributes to lower costs or a better process should not be discouraged, but we think that it should be paid for only once.

In applying a cure, suppliers, on one side, need to screen out casual inquiries from potential customers who may be fishing for free ideas.

Customers, on the other side, need to decide in advance what they want to accomplish with a new installation or process, check its feasibility with people who could do the job, pick a supplier, and include special engineering in the price.

Both suppliers and customers, through their association groups, need to seriously consider more ethical selling and buying practices—without getting into collusive pricing.

What we are really talking about is a better understanding between sellers and buyers, so that the seller has enough profit in a job to give the buyer exactly what he ordered.

We hope you will agree it's about time to join the movement to replace free engineering with paid engineering!

Irwin H. Such

EDITOR-IN-CHIEF

PROGRESS REPORT

STORA-KALDO OXYGEN STEELMAKING DEVELOPMENTS

In England, the Consett Iron Company Limited recently announced plans to install two 110-ton Stora-Kaldo convertors . . . in France, Sollac (Societe Lorraine de Laminage Continu) began operating their new 110-ton Stora-Kaldo converter in April . . . in Oxelosund, Sweden, another facility with 110-ton vessels will start production early in 1961 . . . in Domnarvet, Sweden, installation of converters of comparable capacity has been programmed.

The original 30-ton facility at Domnarvet has passed the three-hundred-thousand-ton mark. Steelmakers from the United States have witnessed production, by this process, of a wide range of grades of carbon steel—1005 to 1095—without recarburization. The specified steel chemistry and tapping temperatures were met exactly. Slabs and ingots were shipped to the United States and processed into finished products, ranging from deep-drawing material to cutlery stock. Comments from ultimate users ran from "good" to "the best material we ever had."

These events and the facts detailed below are causing more and more steel producers to take a close, hard look at the Stora-Kaldo process:

FACT NO. 1. What is believed to be the largest single heat—122 tons—ever produced in a basic oxygen converter of any type was produced by Sollac with its Stora-Kaldo facility (23 cubic feet of furnace volume per ton of rated capacity). Consistent heats of 130 tons and more are programmed as this installation reaches normal production later this year.

FACT NO. 2. The ingot yield of virtually every heat at Sollac *has exceeded* 90 per cent since operations started.

FACT NO. 3. Capital costs for a Stora-Kaldo installation are comparable to or lower than competitive processes for equivalent capacity and conditions.

FACT NO. 4. The Stora-Kaldo process is inherently flexible in its ability to produce, within precise metallurgical limits, a wide variety of carbon steels on a heat-to-heat basis—not a "hit or miss" basis—without recarburization and at desired tapping temperatures.

FACT NO. 5. Slag analyses show refractory consumption of 24 pounds per ton of steel, during initial operations of a 110-ton Stora-Kaldo converter, when heat times were considerably longer than normal during crew training programs. This performance substantiates the value of recent lining design developments and assures continuous operation of two vessels in a three vessel plant.

FACT NO. 6. The process can be operated with 96 to 98 per cent purity oxygen to produce steel having a nitrogen content of .003 per cent or less. A typical heat analysis using 99.5 per cent oxygen showed:

	Hot Metal	*Ladle*
C	3.6	.061
Mn	.330	.395
P	1.7	.015
S	.045	.011
N_2	—	.002

FACT NO. 7. Oxygen flow rates currently are 5,000 cubic feet per minute and are being accelerated. Oxygen consumption is approximately 1,950 cubic feet per ton of steel when scrap is used for cooling.

FACT NO. 8. High percentages of scrap and ore can be used for coolant. The thermal efficiency of the process permits scrap addition of up to 50 per cent of total metallics charged. This will produce one and three-quarter tons of steel per ton of hot metal. If ore is used for coolant, approximately one ton of steel is produced per ton of hot metal.

FACT NO. 9. Size of gas cleaning equipment required is modest because carbon monoxide is almost totally burned inside the furnace. The exhaust hood is a simple water-cooled duct. The oxygen lance is a water-cooled pipe which projects through and is connected to the hood. The lance is automatically positioned as the hood is moved into place. Normal lance life is in excess of one thousand heats.

Engineering specialists are available to prepare economic and feasibility studies to help you evaluate the Stora-Kaldo process as it applies to your individual operations. Under United States and Canadian rights granted by Stora Kopparbergs Bergslags Aktiebolag, Sweden, Dravo can furnish complete design, manufacturing, construction and installation of Stora-Kaldo facilities, providing undivided responsibility for the entire contract.

For more information, write or phone Dravo Corporation, Pittsburgh 22, Pennsylvania, EXpress 1-2600.

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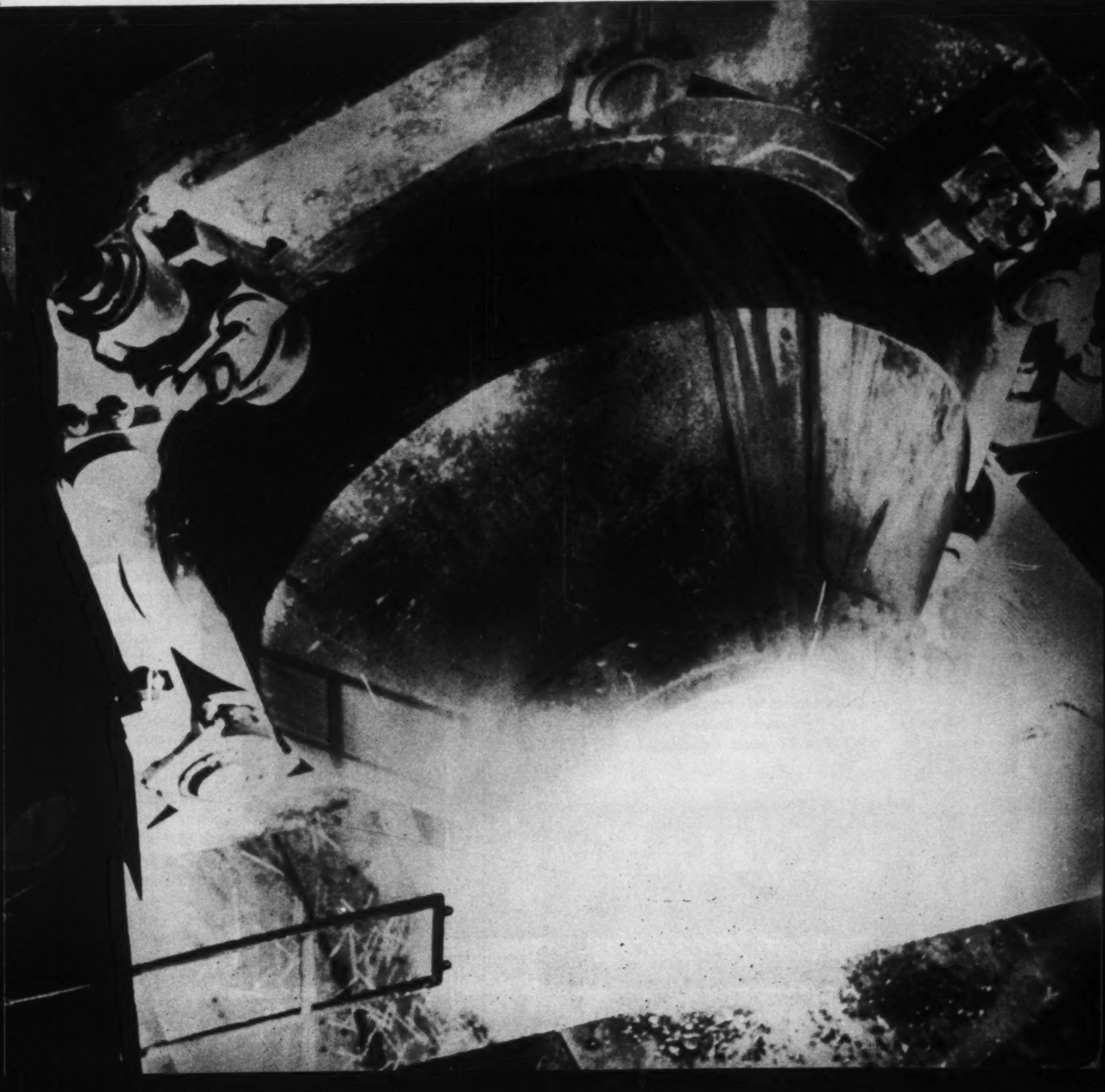
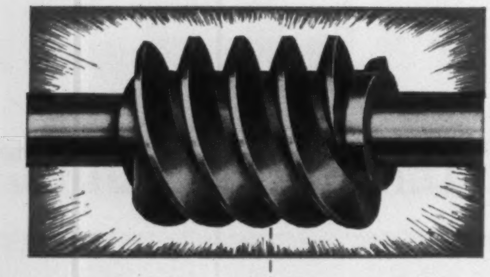
CORPORATION

—SHARP FOCUS ON BETTER STEEL PRODUCTION





Cleveland's Master worm principle enables exact mating of any replacement worm or gear...

if ever required!

These original Master Worms —our "common denominator" of quality—as well as all hobs for each size and ratio of Cleveland worm gearing are individually produced in our tool room to extremely close tolerances. Furthermore, each hob is painstakingly checked against the master worm—as are all Cleveland production worms and gears.

It's never necessary to replace Cleveland worms and gears in *sets*. Because, each Cleveland production worm or gear is a duplicate of each other.

A new gear will always mate exactly with an old worm and vice versa. Cleveland's Master Worms are never destroyed but kept in perpetual stock—always available at a moment's notice. So, you're guaranteed perfectly fitting worms or gears for service and maintenance requirements.

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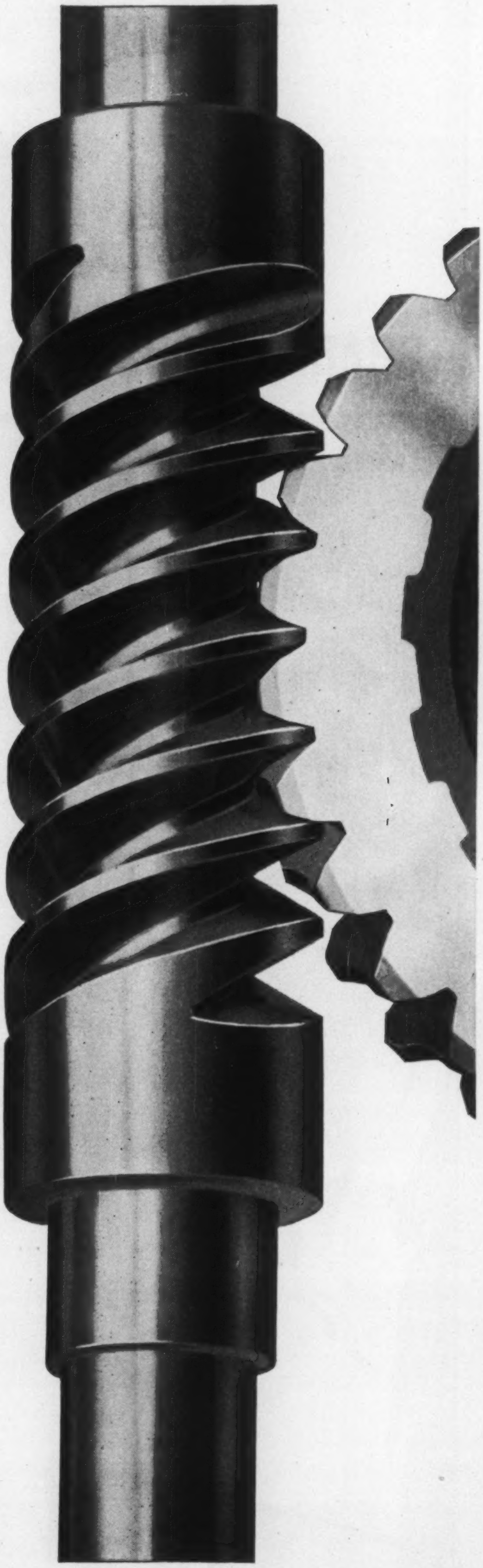


Forging Industry Fights Back

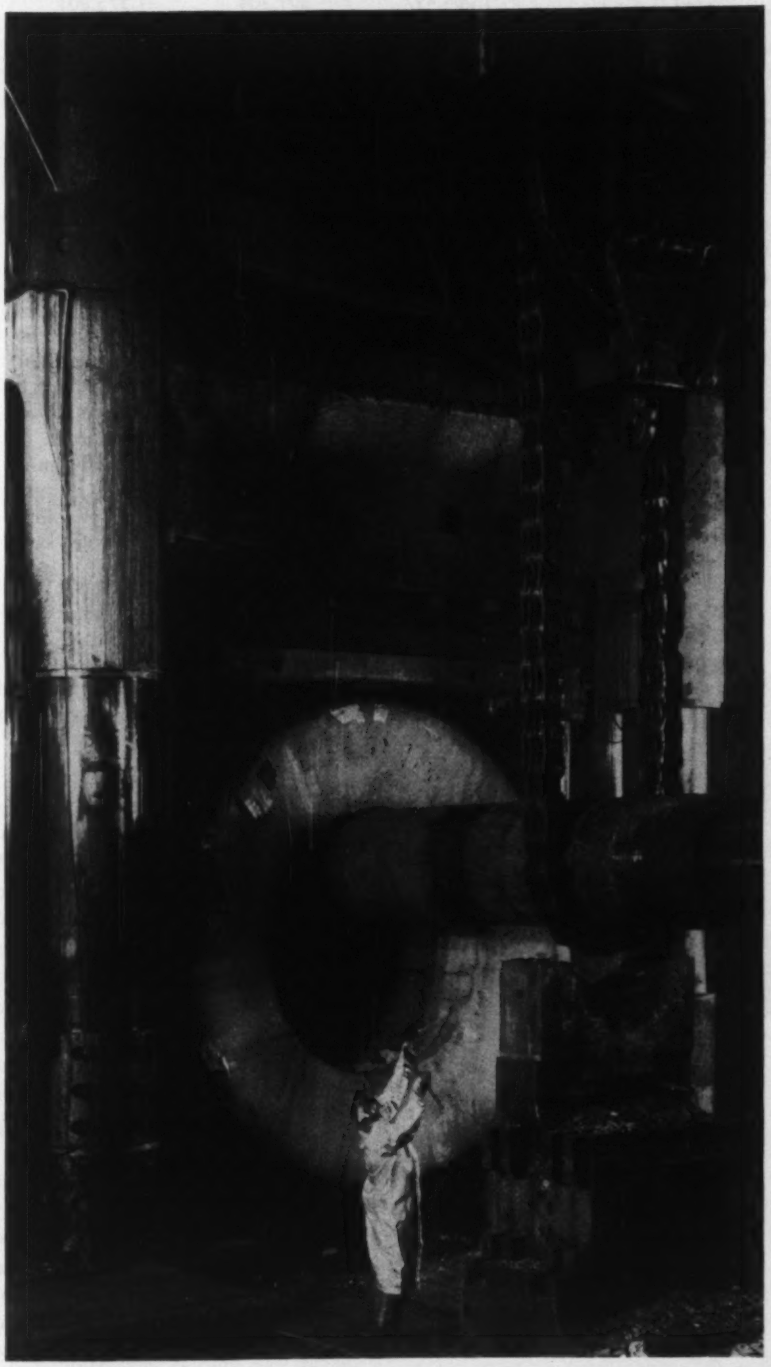
It is battling a profit squeeze, imports, and overcapacity. The plan of attack will also work for other industries

"WE'RE OVERBUILT but underfed," the top man at the big forging company snorted. "We've got too much capacity in this industry and not enough business to go around. Everybody cuts prices and nobody makes enough money."

The comment is typical—only 27 per cent of the forging industry's production capacity is being utilized. But forgers are fighting back. Says Dwight M. Allgood, executive vice president of the Drop Forging Association, Cleveland: "Overcapacity is a natural force causing healthy competition. We must cannibalize our outmoded capacity and replace it with more efficient, modern equipment."

• **Figures Misleading**—The industry's plight isn't as bad as the shipment figures (see next page) suggest, Mr. Allgood points out. Reason: Forgers are using better designs and higher cost steels than they did a few years ago, plus larger quantities of other metals, such as copper, brass, and aluminum. Today, the emphasis is on dollars billed, not tons shipped. Case in point: From 1954 to 1958, steel forging shipments dropped from 1.4 million tons to 1.1 million tons, but the value of shipments jumped from $702 million to $747 million.

For most forgers, this year's first half was better than the corresponding period of 1959. Sales of a large drop forge company in the Chicago area were "well ahead of 1955's record rate." A Pittsburgh firm specializing in open die work had "six good months in a row—our best since 1957." In July, storm clouds



Mandrel forging a giant ring for a nuclear reactor on a 10,000 ton press at U.S. Steel's Homestead Works

Steel Forgers Battle To Reverse Downtrend

(Shipments for sale in net tons)

	Drop & Upset	Press & Open Hammer	Total
1961*	1,150,000	335,000	1,485,000
1960*	1,085,000	315,000	1,400,000
1959	1,064,497	309,304	1,373,801
1958	823,857	255,576	1,079,433
1957	1,120,428	376,147	1,496,575
1956	1,256,125	414,182	1,670,307
1955	1,316,540	434,093	1,750,633

Source: U. S. Bureau of the Census.
*Estimated by STEEL.

gathered. Capital equipment manufacturers started to retrench and liquidate inventories. Competition has become as stiff as it was in 1958. But despite the soft third quarter and uncertainty about the fourth, most forgers hold to their belief that this will be a better year than 1959.

- **Pickup Seen In '61**—Business next year depends on the political situation, an industry spokesman believes. He cites these factors: 1. Tariff policy. Further encouragement of low cost imports could cut into profits of U. S. producers. 2. Defense. Bigger spending for military hardware would be a great stimulant. 3. Farm program. More money for farmers would boost sales of agricultural equipment—an important outlet for forgings. 4. Railroad legislation. Mergers, subsidies, competitive rates, and suspension of unprofitable service may strengthen the carriers, permitting them to buy more equipment.

"We think forging sales will be slightly higher next year because the aircraft and missile industry and companies doing defense work will be better off volumewise than they were in 1960," says a large Ohio forging company. "We also think there will be more activity in roadbuilding, which hasn't been up to expectations this year."

- **Imports Threaten**—Spokesmen for the open die forging industry recently warned the U. S. Tariff Commission that imports are hurting U. S. producers. A survey made by the Forging Manufacturers Association shows that 70 per cent of the member companies have lost business in the domestic market to foreign competitors. (One firm reportedly lost $6 million in orders to foreign suppliers during the 1955-57 period alone.) Press forgings (open die) made in Europe are being used

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How a Forger Utilized His Excess Equipment

"Following World War II and the Korean War, our company had an excess of forging equipment," says Charles H. Smith, president, Steel Improvement & Forge Co., Cleveland.

"In considering what to do with the excess equipment, we became interested in Argentina and Brazil. We knew the governments of those countries had expansion programs in basic industries, including automotive. After a series of personal inspection trips, we were convinced that there was a need in both countries for the equipment we had and the knowhow we could supply."

Result: Steel Improvement & Forge used its equipment to set up a forging plant at Cordoba, Argentina, to supply automotive forgings to Industrias Kaiser Argentina. IKA, which produces Jeep utility wagons and passenger cars, is owned by Willys Motors Inc., Renault Motor Co., Steel Improvement & Forge (4 per cent stock ownership), the Argentine government, and public.

In another venture, the Cleveland forging firm joined with American Brake Shoe Co. and Companhia Mechanica e Importadora, an old Brazilian firm, in setting up a plant in Jundiai, near Sao Paulo, Brazil. Both Steel Improvement and American Brake Shoe contributed the equipment to the enterprise. "People are practically standing in line asking us to make forgings there," says Mr. Smith. "We expect to produce 750 tons per month in the fourth quarter, double the rate we produced in the second quarter."

Although concentrating on the South American plants, Steel Improvement & Forge may be operating in other areas soon.

The company has received inquiries from India, Mexico, and Australia.

mainly in ore processing equipment and hydroelectric installations. Large quantities of forgings are coming into the U. S. as parts of turbines and generators purchased abroad.

A big U. S. manufacturer of mining and quarrying equipment has been buying machined forgings from West Germany because it can obtain them, delivered to its plant in the Midwest, at prices 20 to 25 per cent below those of U. S. producers.

In the last four years, imports of open die forgings and products in which they are components have increased by 260 per cent. The forged value of the imports—only a fraction of their commercial value—was $3.8 million in 1955 and $13.5 million in 1959. Imports of closed die forgings increased by 720 per cent during the same period, due largely to the continuing import surge of autos, fittings, and flanges.

• Profit Squeeze—Although they're optimistic about sales prospects, forgers face a profit fight. Despite constantly rising labor and material costs, there have been no general price increases in the last two years. Some items are actually selling for less than they did in 1958. Customer demands for higher quality have required heavy investments in new equipment without compensating price hikes.

The profit squeeze has serious implications. Forgers fear that they may not have enough money for new equipment, research, and programs that will attract promising young men to their industry.

To compete more effectively and increase their profits, forgers are:

- Spending more for advertising, promotion, and research.
- Working through associations to sell forgings—win converts from castings and weldments and convince firms with captive shops that they can often save money by jobbing their work out.
- Using better methods and installing faster, labor saving equipment.
- Tightening quality control and working toward closer tolerances.

To get into a more competitive position on crankshaft work, a large, Eastern, open die forger is installing a new multidirectional press. Says a company official: "With this unique machine, we'll have a cost advantage. We'll operate much more efficiently than we did with open die slab forgings, a process which involves cutting away 40 to 60 per cent of the metal." Other firms are reducing manpower requirements by installing additional manipulators.

"We used to forge (open die) to within 1½ in. of finished size and then start machining," a Pittsburgh production man reports. "Now, with the men using more care, we forge to within ¾ or ⅝ in. of finished size."

• Technology Advances—To improve the quality of its product, one firm has installed vacuum degassing equipment. Some believe that vacuum practice will eliminate segregation, minimize oxide inclusions, and reduce heat treating requirements of high alloy steels.

In Pittsburgh, a drop forger credits improved die design and temperature control equipment for its success in "working a lot of higher alloy steels that we couldn't have forged in the past."

• Market Shift—In 1930, the automotive industry was the biggest buyer of commercial drop forgings. It took about 80 per cent of annual U. S. output. Today, it takes about 25 per cent because it has "gone captive." Missile and aircraft manufacturers are the leading consumers. They account for about 47 per cent of the dollar volume. Other important buyers are the heavy machinery, roadbuilding equipment, railroad, agricultural implement, shipbuilding, and electrical equipment industries.

Although there's little life in the markets that were strong during the late fifties—heavy presses for the Air Force, turbines and generators, commercial aircraft, and farm equipment—forgers aren't discouraged. They see a growth potential in missiles and aircraft—in dollars if not in tonnage. They believe faster machines will require more critical parts—highly alloyed, heat treated forgings.

NICB Panel Sees Fair Business Weather in '61

THE 1961 FORECASTING season is here again and panelists at the Eighth Annual Marketing Conference of the National Industrial Conference Board last week made these predictions:

• Steel Production — Howard V. Clark, executive vice president, Detroit Steel Corp., predicted that steel ingot production will total between 105 million and 110 million tons in 1961, about the same as estimated for this year. Imports this year, he said, will be about 3.5 million to 4 million tons compared with exports of 3 million to 3.25 million tons. In 1961, steel imports are expected to drop to 2.5 million tons vs. exports of 3.25 million tons.

• Oil and Gas—U. S. demand for all petroleum products will exceed 10 million barrels a day for the first time, predicted Vernon A. Bellman, vice president-marketing, Mobil Oil Co. Detroit Steel's Mr. Clark also noted that oil and gas drilling next year should show a modest increase and that pipeline construction should remain at the 1960 level.

• Construction — Residential construction should increase from 1960's pace. Private plant and equipment expenditures should drop slightly next year from this year's estimated $36.4 billion. Next year's government construction outlays will about equal this year's. Some increase is expected in highway programs.

• Machinery — Easing of new orders in the electrical machinery industry indicates that shipments may decline about 4 per cent in 1961 from the 1960 level. Nonelectrical machinery production is expected to continue at its present pace during 1961.

• Autos — 1961 production should equal or top this year's expected 6.5 million, including imports, says Byron J. Nichols, vice president-auto sales, Chrysler Corp. Sales could go as high as 7 million units. He expects compacts (now taking 29 per cent of the market) to account for 35 per cent of all sales in 1961.

SALES ENGINEER

"Business Barometers," a quick, easy system of reporting business activity, enables the company to break down roadblocks to sales and boost managerial efficiency

How GE Boosts Sales Power

1. **Sales engineers send in coded reports on business activity.**
2. **Reports are fed into computer, which yields products, order, and market information.**
3. **Results aid sales force, management, and product departments.**

GENERAL ELECTRIC CO. bid on a half million dollar heat treating furnace for a steel mill, but a "Business Barometer" report by its sales engineer revealed that the company's position was unfavorable because of design.

The report, which pinpointed the trouble, was read by the product department. It had just completed a redesign that corrected the problem. The information was dispatched to the sales engineer, and he was able to get the order.

That's one way GE's system of reporting business activity is paying off. It was started in 1956 by the User Industries Sales Dept. Today, it's employed primarily in the User Industries sales operation of the Apparatus Sales Div.

• **How It Works**—The "Business Barometer" program provides a continuous flow of communications between the field sales engineer and people within the company's product and sales organizations who can help get the order.

Every day, each of the company's sales engineers (it has about 600) target prospective orders from 1 to 15 customers in indexed locations. They put their views of the business picture onto computer cards.

By referring to clearly defined coded symbols, a complete report can be made in less time than it takes to smoke a cigaret. Codes, for example, are assigned to the customer, the customer's industry market, the sales engineer, the area in which he works, the products he sells, and reasons favorable and unfavorable to his securing an order.

• **Factors Weighted** — Dollarwise, each factor is weighted three ways: The gross amount under consideration, the part of the total proposal which the customer is expected to buy after eliminating alternatives and items in the preliminary discussion stages, and an amount corresponding to the salesman's estimate of the probability that GE will get the order.

With all pertinent data fed into a computer, the various reports required for sales planning, direction, and measurement of performance are scheduled for field sales personnel, headquarters, and product department management.

• **How It Helps**—Besides detailing order status, the report breaks down the many qualifying factors which must be resolved. If a sales engineer sees that an order may elude him, he can readily catalog the hurdles he faces. Such categories as design, engineering recommendations, policy, and the previous record of meeting customer's requirements pinpoint the problems.

The technique triggers the teamwork necessary to remove roadblocks. It also initiates constructive factors, such as "influence selling"—pitching the sales program toward every individual who may influence a purchase. The product department gets tips on possible flaws or advantages in products as seen by customers.

"Business Barometers" give an accurate picture of a sales engineer's workload and are helpful in deployment of sales manpower. They also aid the sales engineers in becoming more knowledgeable managers of their own business.

Studies are underway to determine usable business trend information. Because every "Business Barometer" names the customer, the products involved, price, and GE's probability of securing an order and the probable month the order should be received, many elements of forecasting are present.

• **"Fine Tool"**—Concludes Walter A. Mosteller, consultant, industrial sales operation: "I am convinced that . . . we have the finest tool available to any capital goods manufacturer to assist both the sales force and management."

Plant Diversifies

Hercules Motor Corp., Canton, Ohio, is forming a Special Products Div. to specialize in custom machining and finishing of industrial and automotive components. It's heralded as a step toward product diversification. The division will handle engine heads, transmission housings, and other major components.

Tips to Get More R&D Profits

- Make one man responsible for the R&D program.
- Be ready to market new products as they are developed.
- Set up "product pioneering" staff to get the new product off the ground.
- Avoid interdepartmental rivalries.

MANAGEMENT is spending more for research and development, but it's also demanding more for its R&D dollar.

A midyear survey by the American Management Association shows that about 400 U. S. firms will spend 10.7 per cent more for research and development this year than last.

As more money goes into research and development each year, growth companies seek better management of technology, says Dr. Philip Marvin, AMA's research-development manager.

• Glamour Rubs Off—"Mounting costs are rapidly rubbing off the glamour once associated with research and new products," he declares. "If there is any single starting point in planning for growth, its focus lies in better management of technology—in turning ideas into dollars."

Most companies don't know the actual cost of developing new products, Dr. Marvin says.

"While the lifeblood of many industries continues to be new product development," he says, "there is no magic in research if the process wastes money. One of the greatest wastes of time, money, and manpower shows up in development programs because most corporations aren't organized to absorb and put new knowledge and new products to use as rapidly as they are created."

• New Products Gather Dust—Dr. Marvin gave STEEL this account of what is happening in many research departments:

"There are new products on development laboratory shelves . . . that management isn't doing anything about. The products are being developed faster than manufacturing can produce the parts, faster than sales can introduce them into the market. By the time they get to market, they are no good. Decisions on how to produce a product and how to distribute it have taken so long that by the time it gets to market, it has been scooped."

Time is wasted, he says because many new products are re-researched, re-engineered. Interdepartmental rivalries dissipate the value of many a new product, he declares.

• What Should Be Done—Dr. Marvin does not believe that a company's regular sales group can push its standard products and its new products with success. New products cannot be properly marketed by a sales department intent on performance and individual bonuses, he contends.

"A special sales force is needed—a product pioneering group organized to sell a new product on a quota basis.

"One man must be responsible for new product development — from idea to dollar profit. It would be his job, his organization's responsibility," he says.

Dr. Marvin predicted that competition from tax supported technology and a tendency of antitrust and patent policies to undermine the entrenched position of present proprietary products should spur a drive by management to introduce money saving methods for technology.

What Metalworking Spends for R&D

Industry Group	1960 Budget vs. 1959 (% Increase)	1959 Budget % of 1959 Sales
Aircraft	4.0	2.9
Construction Machinery	−1.6	4.4
Electrical Machinery	10.1	2.7
Electronics	16.8	7.7
Engines & Turbines	11.0	1.8
Fabricated Metal Products	1.1	2.4
Instruments, Control Equipment	14.0	6.1
Metalworking Machinery	9.3	2.3
Misc. Machinery, Parts	22.0	3.6
Misc. Manufacturing	9.8	3.2
Nonferrous Metals	7.4	2.1
Office Machinery	11.3	4.2
Steel	5.7	1.6
Transportation Equipment	2.7	1.1

The Soul Searching

Behind Amputating 40% of Your Sales

"Even with red ink staring at you from the balance sheet, it takes a lot of soul searching to go out of a business which is providing 40 per cent of your company's sales," comments Dave Champion, vice president, Champion Rivet Co. "It's particularly difficult when the sales of that business are growing steadily."

If you face a similar situation in one of your product lines, the steps Champion took to solve its problem and get back into profitable operations may help you.

What Champion's Doing to Rebuild

FOR MOST FIRMS, a 30 per cent increase in business over a five-year period would give executives just cause to pat themselves on the back, but not at Champion Rivet Co., a 250 employee Cleveland firm. Its officials fought hard to boost sales of its mild steel welding electrodes 30 per cent (tonnagewise) from 1954 to 1959, yet profits slid steadily. In fact, losses began to appear.

The company did all it could to control costs during the five-year period. It opened a modern plant in Chicago, streamlined its Cleveland manufacturing facilities and distribution activities, and pushed research to lower production costs. But three rounds of wage, material, and freight increases offset any productivity gains it had achieved.

So the company dropped its line of mild steel welding electrodes. "It took soul searching and guts to make the move," confides Dave Champion, the firm's young vice president. "Fortunately, we knew our costs. We had installed a new cost accounting system which clearly demonstrated that profits on the mild steel welding rods weren't keeping pace with our other products—special alloy and stainless welding rods, rivets, and upset forgings."

• Attack for Survival — "We brought in a marketing consultant to help us evaluate our strengths and weaknesses—he was also good in the role of referee for internal push-pull situations," relates Mr. Champion. These strengths emerged from the study:

1. Champion had a good sales team. ("It had to be to survive in the competitive welding rod business.")

2. The firm's marketing position and reputation for rivets were strong.

3. It was carving out a special niche in the upset forging business—it's newest product line, and it had the design knowhow needed to expand product applications.

Heading the list of the weak spots was the profit return on the mild steel welding rods. Company organization and sales territory alignment appeared cumbersome. Order handling needed streamlining.

Champion notified all its customers on Jan. 2 that it was going out of the mild steel welding rod business. Here's the program it mapped out for a comeback.

• Special Rods Stay—Profits on the special alloy, stainless, and hard facing welding rods remained good, while margins on the mild steel rods dropped. So the firm decided to remain in this segment of the business—concentrating on the "exotic" type rods which are generally custommade. Research efforts in this line are being stepped up, and a sales force of technical men qualified to assist in the selection of special rods for the power, petroleum, atomic energy, and missile fields is being developed.

• Territory Alignment—Previously, the firm had its sales activities broken down into 27 areas. A comprehensive market study was made of sales records, covering customers, their location, and purchases by product.

With the discontinuance of mild steel welding rods, many distributors and manufacturers' representatives had to be dropped.

The country was then cut up into nine sales areas, with sales potential and the travel patterns of salesmen carefully considered. In a few instances, manufacturers' representatives are used, but company salesmen form the hard core of the team.

Salesmen were then given the names of all companies in their territories—they were gleaned from a number of sources, including current customers, past customers, and mailing lists. Currently, the sales force is completing a canvass of all of the names so they can rate customers and prospects and screen out any who don't belong on either list.

• Better Order Handling—The firm previously scheduled rivet production as orders came in—little inventorying was done. With the marketing study on customers and the products they purchased, Champion was able to develop purchase patterns. "This enabled us to establish an inventorying program in which we stock over 100 types of rivets," explains Mr. Champion. "We're in a position now to ship standard rivets on the same day the order is received. On the specials, we can give three day service."

In addition to establishing the inventorying program — there are warehouses in both Cleveland and Chicago—new order entry forms, files, and procedures were installed to speed up the order handling process.

• Management Realignment — To provide better control and pinpoint responsibility, several management shifts were made. All rivet manufacturing was shifted to the Chicago plant, and a resident vice president was put in charge there. A Cleveland plant manager with special skills in methods and procedures analysis was made assistant to the president. He has authority to investigate and recommend changes in any activity of the firm.

Division managers were appointed for each of the product lines—special welding rods, upset forgings, and rivets—and each has the basic sales and profit responsibility for his line.

To enable the division managers to provide more help to regional sales managers and control over them, a new call report system was developed. It simplifies the work required by the salesman in filling it out and yet provides more information than previous call reports.

• More Foreign Activities—In 1953, Champion set up welding rod manufacturing facilities in Mexico City —part of the facility is owned by Mexican interests, and nationals operate the plant.

Growth in that plant has been rapid, and Champion discovered a "plus factor" in its otherwise sad domestic welding rod situation. The modern equipment of the Chicago plant is being sent to the Mexico City plant to expand capacity there.

Champion also recently completed negotiations for building a welding rod plant in Lima, Peru. The equipment formerly used for rod manufacturing in Cleveland is being shipped to Lima to form the nucleus of the facilities there.

• Forgings for Growth—The Cleveland firm is pinning much of its expansion plans on upset forgings —an activity that's only five years old. "We've got a lot of knowhow in this area," comments Mr. Champion. "Out in the laboratory, we're close to a new development that'll really send us places." The firm is backing up its confidence with $250,000 in new equipment for upset forgings.

Champion officials admit that the dropping of its mild steel welding rod business was a drastic step and that a few rough edges need to be worked out. But the prospects look good. In the first half —when this retrenching took place —profits reached their highest point in over two years, even with the much lower sales base.

Champion's major target: Regain the sales volume lost through its major surgery by 1962.

Tool Builder Takes on Foreign Equipment

AN INCREASING number of U. S. companies are entering into working agreements with overseas firms.

Example: Pratt & Whitney Co. Inc., West Hartford, Conn., has completed arrangements to distribute machine tools made in Japan and Italy in this country. The firm will handle small milling, boring, and combined machines made by Mitsubishi Ship Building & Engineering Co. Ltd., Tokyo, and larger boring mills manufactured by Innocenti S. G., Milan.

Pratt & Whitney already sells a French lathe and some products made in Great Britain by E.M.I. Electronics Ltd. The company has also licensed Pratt Whitney & Herbert Ltd. to manufacture and sell a Keller machine in Great Britain.

• Behind the Move—Jacob J. Jaeger, Pratt & Whitney's president, believes U. S. manufacturers are allowing their plants to become obsolete because of the cost-profit squeeze. Result: The U. S. machine tool industry is operating at low volume because customers aren't updating equipment.

"Some people are urging tariffs on imports or import quotas," comments Mr. Jaeger. "Restriction of imports is exactly what is not needed by the U. S. machine tool builder," he says. "About 50 per cent of the production of some builders is for export. If the U. S. restricts imports of machine tools, you can be certain the countries where we are now selling so much of our production will retaliate."

Mr. Jaeger concludes: "The cure is installation of better machine tools and production machinery that will enable our manufacturers to reduce production costs, whether the machines are made here or abroad."

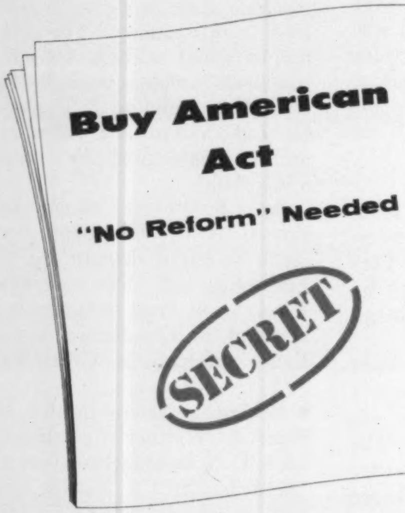
SBA Loan Approvals Up 7%

Government loans to assist small firms increased more than 7 per cent during July compared with the same month a year ago, reports Philip McCallum, administrator, Small Business Administration.

During July, the agency approved 233 loans for $11,365,000.

WINDOWS OF WASHINGTON

U.S. Increases Overseas Buying, 'Confidential' Buy American Report Reveals . . . FTC Seeks Confidential Census Data



THE FEDERAL government has increased its buying overseas tremendously in the last two years, STEEL learned from a report that has been classified as confidential.

Ten government agencies were surveyed by the Bureau of the Budget as a result of appeals by several industries for relief from "injurious" foreign competition. The report shows that from fiscal 1958 to fiscal 1959 awards to foreign countries by the ten agencies increased four times—from about $10 million worth of products to just under $40 million worth. Significantly, most of the buying is done by three agencies: The Defense Department, the Interior Department, and the Tennessee Valley Authority. The three awarded contracts for more than $9 million worth of products to overseas manufacturers in fiscal 1958, more than $37 million in fiscal 1959.

● **IT RECOMMENDS STATUS QUO**—The report also includes recommendations for changes in the Buy American Act, which is domestic industry's check on wholesale overseas purchases by the U. S. (It allows domestic manufacturers a 6 per cent differential when bidding against foreigners, plus another 6 per cent if they are in labor surplus areas.)

The Budget Bureau asked the ten agencies if they thought the 6 per cent differential should be raised. They replied that it didn't make any difference. The Bureau concludes that the policies of protecting U. S. industry, as established by the Buy American Act, are being achieved.

A U. S. bidder must show that not more than 50 per cent of his subcontracting will be overseas to qualify for the 6 per cent differential. (Several companies recently approached that limitation in their efforts to secure contracts.) What the sub-subcontractor does can be no concern of the government, concludes the Bureau, because his overseas purchases would be too difficult to investigate.

The Bureau even tightens the noose on the domestic bidder a little by recommending that inspection costs be tacked onto a U. S. firm's bid in the same manner they are added to a foreign manufacturer's bid.

● **DOES IT FEAR POLITICAL REPERCUSSIONS?**—The study concludes that foreign purchases by government agencies have increased but that such buying is relatively small and that the government has benefited by saving money. In addition, the Bureau concludes that the current operation of the Buy American Act is in agreement with our foreign policy.

Reading between the lines, you can see that the Bureau gives the President's order of 1954 (which reduced the differential from 25 to 6 per cent) credit for cutting the guts out of the original act. Crux: Domestic manufacturers can expect no help from the Republican administration in returning the act to its original purpose.

● **FTC SEEKS CONFIDENTIAL REPORTS**—The U. S. Bureau of the Census may be forced to release heretofore confidential business data to the Federal Trade Commission for use in the prosecution of antitrust cases. A decision by the U. S. Supreme Court during its next session (it starts Oct. 3) is expected to decide the case. FTC, with the backing of the Justice Department, believes the marketing data (which businessmen are required to give to the Census Bureau) could aid its prosecution of cases like the proposed Bethlehem-Youngstown merger. Census refused to release such data early in the Bethlehem case.

Census argues that it has promised businessmen their data would not be released. FTC argues that any data which would catch violators of antitrust laws must be made available. The FTC is appealing a lower court decision which backed the Census Bureau's point of view. The Chicago U. S. Court of Appeals said: "The U. S. has given its word and should keep it."

● **CAPITOL NOTES**—Democrats will make a new effort in January to pass a depressed areas bill . . . Some headquarters personnel of the United Steelworkers of America are working for the Kennedy forces without pay . . . Rep. William K. Van Pelt (R., Wis.) wants legislation passed requiring the U. S. government to make its purchases from domestic manufacturers unless the products will be used outside the country, or they are not available here.

CINCINNATI

FILMATIC

Exposition revealed many benefits...

MMT-PE

Immediate *cost-reducing possibilities* available through...

CINCINNATI'S New Centerless Grinding Machines and ideas

New ideas . . . new machines . . . new ways to reduce costs were evident everywhere at the Machine Tool Exposition. In the bustling crowds, perhaps you did not have time to ponder the possibilities offered by three fine Centerless Grinders which were included in Cincinnati's extensive exhibit. The operations which they were performing are illustrated at the left.

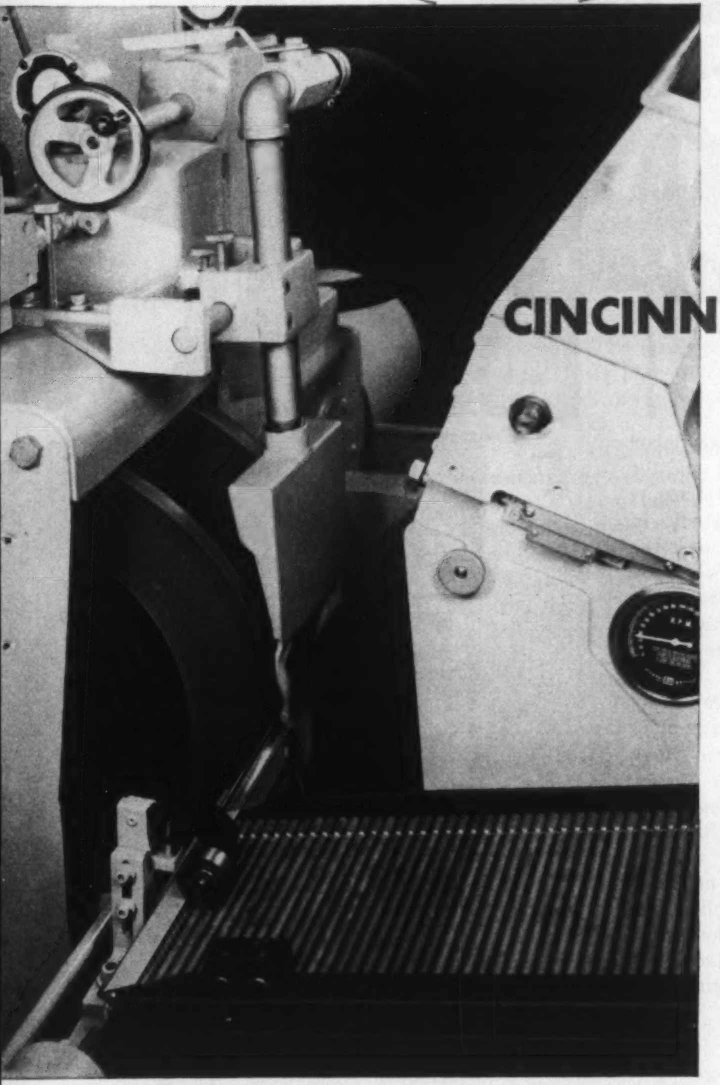
Smallest of the Cincinnati line, the No. 107-4, was tooled up with crush truing equipment to grind grooves from the solid in ½" diam. spools (part B). Electro-hydraulic automatic infeed and automatic loading maintain a uniformly high rate of production for work of this type.

The No. 220-8 Centuramic, a 20 hp machine, demonstrated a setup having wide application. Diameters at the ends of a shaft 8½" long (part A) were ground to accurate size and exactly in line with each other. FILMATIC spindle bearings give an excellent account of themselves by preventing spindle deflection, thereby assuring exact alignment of the ground diameters.

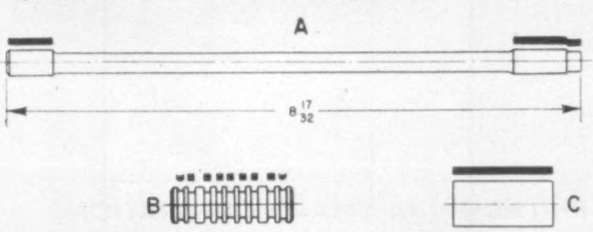
The No. 340-20 Centuramic Centerless, with 20" wide wheels and a 40 hp spindle drive motor, ground short steel pins (part C), removing .007" stock in two passes at the fast thrufeed rate of 15 ft. per min.

CINCINNATI Centerless Grinders, coupled with 38 years of centerless engineering service, are outstanding candidates for your immediate and future cost-reduction program. May we give you more information?

Grinding Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.



Grinding three diameters at the ends of shafts 8½" long (part A). CINCINNATI No. 220-8 Centuramic Centerless Grinding Machine is tooled up with automatic work handling for this operation.



Three ideas in low cost centerless grinding were revealed by the setups to grind the parts illustrated above.

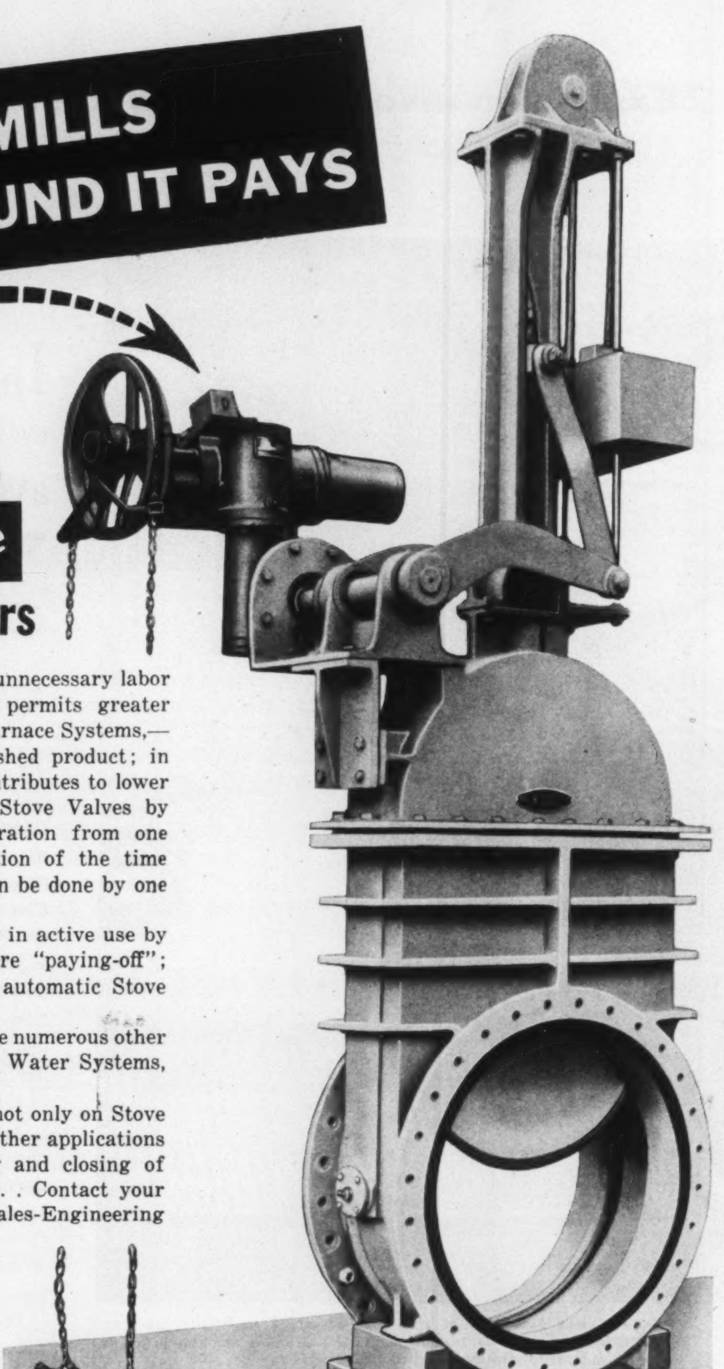
PRECISION GRINDING MACHINES: CENTERTYPE · CENTERLESS · MICRO-CENTRIC · ROLL · CHUCKING · CENTERLESS LAPPING

CINCINNATI

GRINDING MACHINE DIVISION

MANY STEEL MILLS HAVE FOUND IT PAYS

. . . to Motorize their stove changing valves with LimiTorque "Push-Button" Operators



LimiTorque not only saves time, money and unnecessary labor over hand operated Stove Valves, but it permits greater accuracy in controlling conditions in Blast Furnace Systems,—which in turn contributes to a better finished product; in fact, automatic operation by LimiTorque contributes to lower operating costs. Push-button changing of Stove Valves by LimiTorque gives automatic sequence operation from one position to another; requires only a fraction of the time required by hand operation,—and the job can be done by one man from any convenient location.

Complete Stove Valve Systems are already in active use by a number of well known companies and are "paying-off"; while many other firms now have partially automatic Stove Valve systems actuated by LimiTorque.

LimiTorque motorized Valve Operators have numerous other applications in Steel and Iron mills, such as Water Systems, Gas Systems, etc.

We will gladly send you full information, not only on Stove Valve Operation by LimiTorque, but also on other applications involving the automatic motorized, opening and closing of Toggle, Gate, Butterfly and Globe Valves . . . Contact your Valve manufacturer or nearest LimiTorque Sales-Engineering Office.

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CONTROL

Write for complete Catalog L-550—and please use your Business Letterhead when requesting it.

THERE IS NO SUBSTITUTE FOR —

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INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID AGITATORS • FLEXIBLE COUPLINGS
Limitorque Corporation • King of Prussia, Penna.

How Design Research Pays Off

"WE have long known that our plants could forge a chair base for office furniture," says Samuel L. Fahnestock, manager of design, Aluminum Co. of America, "but we were never able to do so at a competitive cost. We consulted with the designer for a large furniture manufacturer and went into the plant to examine and think about the forging process. Hours were spent . . . looking at the machinery . . . discussing what it can and cannot produce . . . questioning every item."

Result: The designer developed a forged chair base that's competitive with those made by other fabricating methods.

That's an example of how design research can pay off for metalworkers. To give you an idea of the potential, listen to Walter P. Margulies, president of Lippincott & Margulies Inc., a New York industrial design firm: "The majority of today's industrial equipment is poorly designed as to appearance and function." (Mr. Margulies is pictured at left, standing.)

Danforth Cardozo Jr., product design supervisor of the industrial design firm of Walter Dorwin Teague Associates, has this to say: "There is a growing recognition that even functional items can benefit by good design. They can be made more pleasant to use, which increases their acceptance. You will also see less and less change just for the sake of change. More and more design changes will incorporate new and improved functions. Metalworking products may gain the sales edge with little things—easier to service, to use, to look at."

- **What Is It?**—Design research has been called the creative side of marketing. It incorporates imagination and common sense with the measurable tools of consumer research and value analysis.

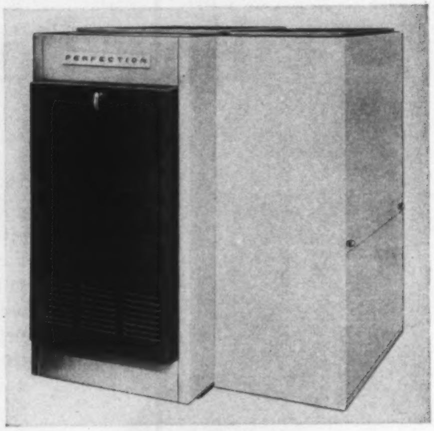
Mr. Margulies defines the chal-

Perfection's Design Research Goal:
GIVE THE CUSTOMER A BETTER BUY

When Perfection Div. of Hupp Corp. decided to give its line of home furnaces a "new look," General Manager Anthony J. DeFino set these three study areas for design research:

1. External Design: What does the customer want in appearance?
2. Consumer Efficiency: What improvements can be made in operation, installation, and space consumption?
3. Production Efficiency: How can design changes speed and ease production of more than 40 gas fired and 20 oil fired models?

FROM THIS



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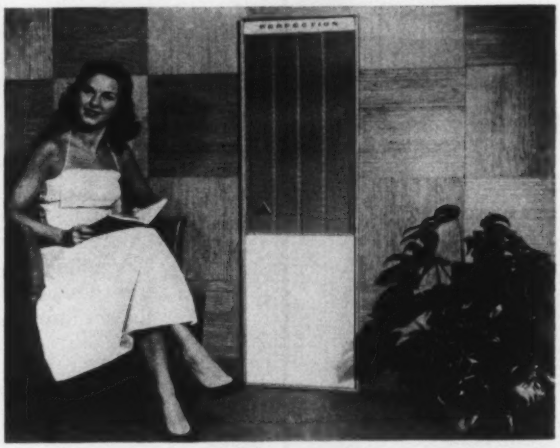


● **FINDINGS**—Design researchers quickly discovered these four problem areas that were working against sales:

● Units were ugly, with sheet metal bulges on all sides. Styling and color doomed those sold to the basement.

● All models were too big. A typical gas model consumed more than 13 sq ft of home space, expensive for the homeowner and builder at average going rates of $14 per sq ft.

● Units couldn't be built in easily. Gas controls were in front, filters and blowers could only be reached from the side, and the exhaust was at the rear.

● Furnace dimensions varied widely from model to model. Builders weren't able to standardize heating plants for housing developments if more than one size home was being built.

● **SOLUTIONS**—Here's how Perfection redesigned to build a better unit for less cost:

● The cabinet has been styled for eye appeal. Sides and back are finished in light gray, with a white front panel and aluminum finish, expanded metal grill trimmed in chrome.

● Total furnace size has been cut. Slightly more than 3 sq ft of floor space is now needed for a typical unit. Design of a modular burner and heat bank allows capacity to be increased in units of 25,000 Btu by merely welding on another flame contoured, heat bank unit. Now, only one burner size and one heat exchanger unit size are needed. Cabinet dimensions need vary only in width. The new heat bank is smaller, more efficient. Savings: An average of 10 sq ft for the builder and homeowner.

● Units have been designed as "built-ins." Internal aluminum finish reflectors have been developed to radiate heat back into the furnace, eliminating bulky insulation and making zero-clearance installation possible. All controls, blowers, and filters have been made accessible through the front. The unit is now easier to service.

● Parts have been standardized. Blowers, filters, and fan drives now are interchangeable in the different models. Upflow, counterflow, low-boy, and horizontal furnaces use the same basic components in different configurations.

● **RESULTS**—Sales have doubled in each of the last three years. A big share of the credit goes to design research.

lenge and the problem this way: "We must find out what people want, how they want it, and what they will pay for it. Then we have to design this product and sell it for a profit.

"The consumer can tell you the area of his needs. The designer and engineer can come up with the solution to these needs. But many companies are still relying on past know-how, past materials, past and inadequate means of distribution. These companies, unless they change quickly, will be left far behind. Companies shucking old ideas for new concepts will be the leaders of tomorrow."

Here are six areas in which design research can pay off:

● **Better Styling** — This is an area given little attention in the industrial product field. Yet designers agree styling should convey the most logical expression of the machine's function.

As Milton Immermann, partner in Walter Dorwin Teague, puts it: "You must reveal through appearance all the attributes built into the device. Appearance must hold promise of what the device will do."

Mr. Margulies adds this incentive to better styling: "The average consumer, even of large equipment, buys primarily on emotion. All other factors being equal, a machine that looks more like it can perform the function will outsell its rivals."

● **Better Engineering** — The goal here is to make the product more efficient and more economical for the customer to use. His needs are emphasized—whatever is important to the buyer, that's what design research concentrates on. Examples: Minimize or eliminate maintenance, repairs, and installation; automate products, or help the customer eliminate a tedious and expensive operation.

• **Human Engineering**—The idea here is to make the product easier to use and operate; to make it safer; to cut down on boredom and fatigue; to eliminate fears that the product is too complicated.

• **Develop a Corporate Image**—Design research can give a big assist in more effective brand identification through the proper use of nameplates, trademarks, similarity in constructional design. Design can project a picture of cleanness, freshness, newness.

• **Production Economies** — Design research operates to help you turn out a better product at less cost.

• **Better Packaging** — "The proper packaging takes a tremendous amount of research," explains William T. Snaith, managing partner of Raymond Loewy Associates, industrial designers. "You want your package to make the product easier to sell, to convey the company image, and to point up the difference between your product and the

HOW NORTON DESIGNS GRINDERS

At Norton Co., design research is a continuing effort directed toward the development of units that will perform their machining operations more efficiently, produce work of better quality, and at less cost to the user, says Robert D. Lawson, vice president and sales manager of the Machine Tool Div.

• **DESIGN AIMS**—Here are Norton's design aims in the order of their importance:

1. Product economies: "Usually we can sell a machine tool only when we can convince the buyer that the unit will produce work at a lower cost than his old machine or those offered by competitors."

2. Simpler to operate: "If the customer is a mass producer, the operators of his machines will often be unskilled or semiskilled workers. Automated machines which require little or no skill to run are essential."

3. Better engineered unit: "Besides accomplishing 1 and 2, better engineering may also mean a machine tool that is easier or less complicated to build or one that eliminates or minimizes conditions that previously were subject to more than normal maintenance and repair."

4. More pleasing appearance: "This is important but not generally a deciding factor in the purchase. If the appearance can be made pleasing, fine. But the buyer is willing to sacrifice clean, smooth lines, in order that parts subject to maintenance and adjustment are readily accessible to prevent loss of production time."

• **HOW IT'S DONE**—At Norton, design research is conducted by a group set up to do applied research in the field of grinding machine operation," says Mr. Lawson. "The group investigates the basic theories of grinding with the aim of creating concepts of machine design which conform to the theoretically correct mechanisms. Research is also directed toward continually improving the reliability and accuracy of individual elements of the machine (for example, over the years, hydraulic systems have replaced many mechanical mechanisms for better control)."

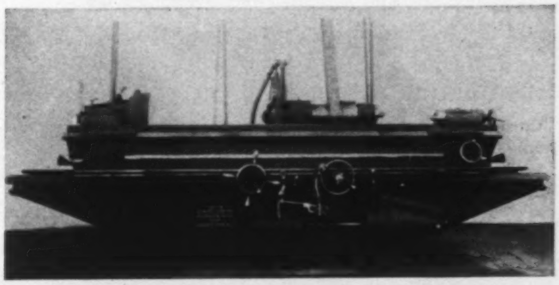
Heavy emphasis is given to designing units that require less human attention and skill, says Mr. Lawson. As important: Designing a machine that will do the required work in a definite time cycle producing a part of the required size, finish, and quality.

• **WHY REDESIGN**—Mr. Lawson says several things prompt a company to redesign:

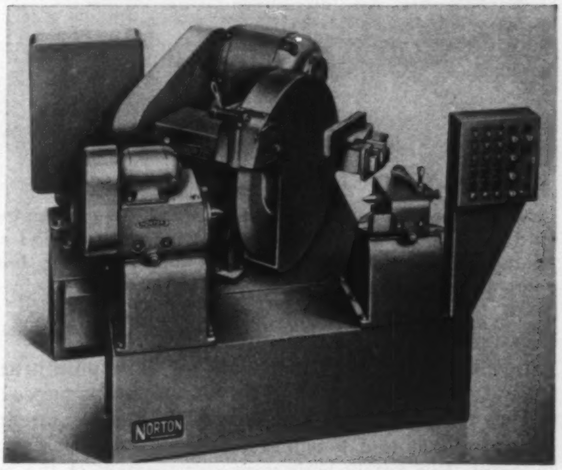
• A competitor comes out with a unit that is equal or superior to your model.

• The work to be produced on the machine has closer limits of size or surface finish than the older machine can meet consistently.

• Someone within the company develops a new concept of machine operation or control that will improve the product or cut costs, either for the builder of the tool, the buyer of the tool, or both.



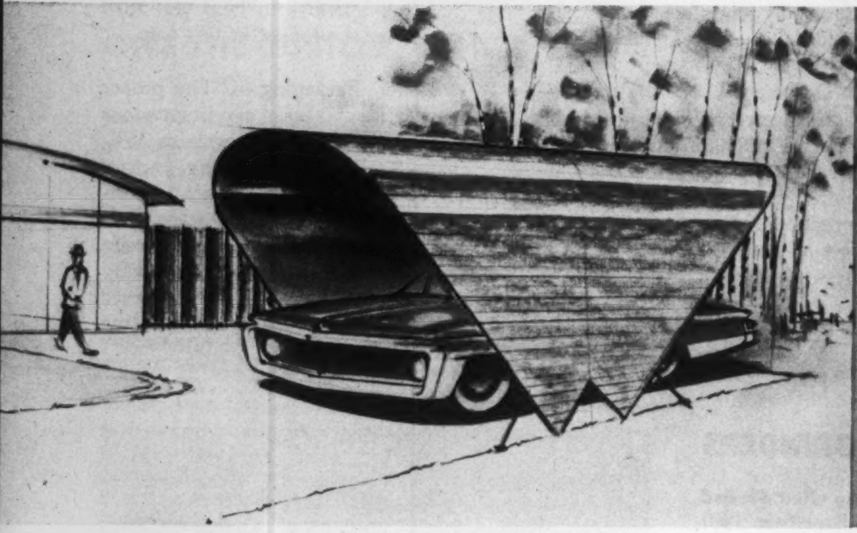
1900: The first heavy duty, precision, cylindrical grinder invented by Charles H. Norton. Controls were mechanical and power was supplied by overhead belts. The unit required an expert operator



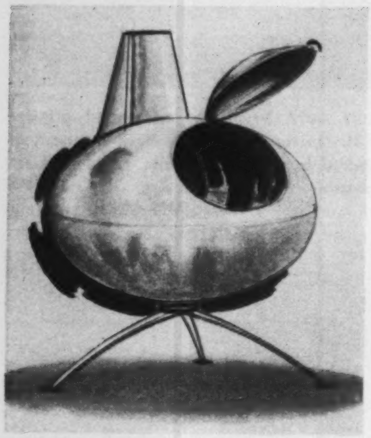
1960: "Plunge-O-Matic," special purpose, cylindrical grinder designed for plunge grinding a single part. Slide worktable has been eliminated. Unitized construction permits individual components, such as the wheel slide, to be placed on the base in correct position for part being ground (here the machine was assembled for an angular grind). The unit is designed for fully automatic operation

STYLING IN STEEL

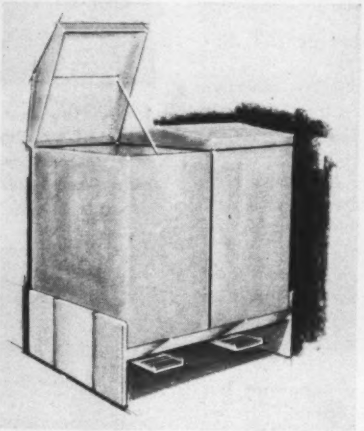
These designs by Lippincott & Margulies Inc. give steel a new look. The New York industrial design firm developed these concepts to illustrate the unlimited number of new products that could be made of steel. The metal's low cost, formability, ease of construction, and compatibility with colorful plastic coatings are emphasized.



"Carport, tool shed, camp shelter—would offer a variety of uses to the modern home owner seeking inexpensive, colorful products"



"Not a flying saucer . . . but a backyard incinerator . . . designed to enhance rather than detract from the appearance of modern homes"



"Garbage can-trash receptacle, made from vinyl clad or vinyl sprayed steel, would offer brilliant colors, lasting beauty"

one offered by your competitor."

• **How to Do It**—There's no formula for conducting a design research program. But certain basic steps are common to most. Here's how Mr. Snaith lists them:

1. Do a complete and comprehensive market study to determine what the customer wants and needs. 2. Develop the design to fit the results of the market research. 3. Finally, play back the results to the consumer to see what he thinks.

Here's how design research operates at American Machine & Foundry Co. in the introduction of a new product: "We know that to merely accomplish a technical development is not to succeed in the market place, so, first, we find out if there's a market for the product . . . then the nature of the market . . . and then we design for the market.

"We deeply research everything from consumer buying habits to the color and safety requirements needed for the product. We talk with our customers about human engineering and appearance features, and with our own people about the investment required, production facilities, and other intercompany economic aspects," says Hamilton Herman, vice president and director of research and development.

• **Tips**—Your design results will have better customer acceptance if you keep these five points in mind, says Lippincott & Margulies.

1. Offer products that are functional. Style for convenience and efficiency, as well as for looks. Avoid gadgets for the sake of gadgetry.

2. Offer products that represent true technological advance. To date, no manufacturer has fully exploited the selling power of really dramatic design and functional change, says L&M.

3. Offer products that are easy and inexpensive to maintain. Incorporate replacement as well as production economies into your design.

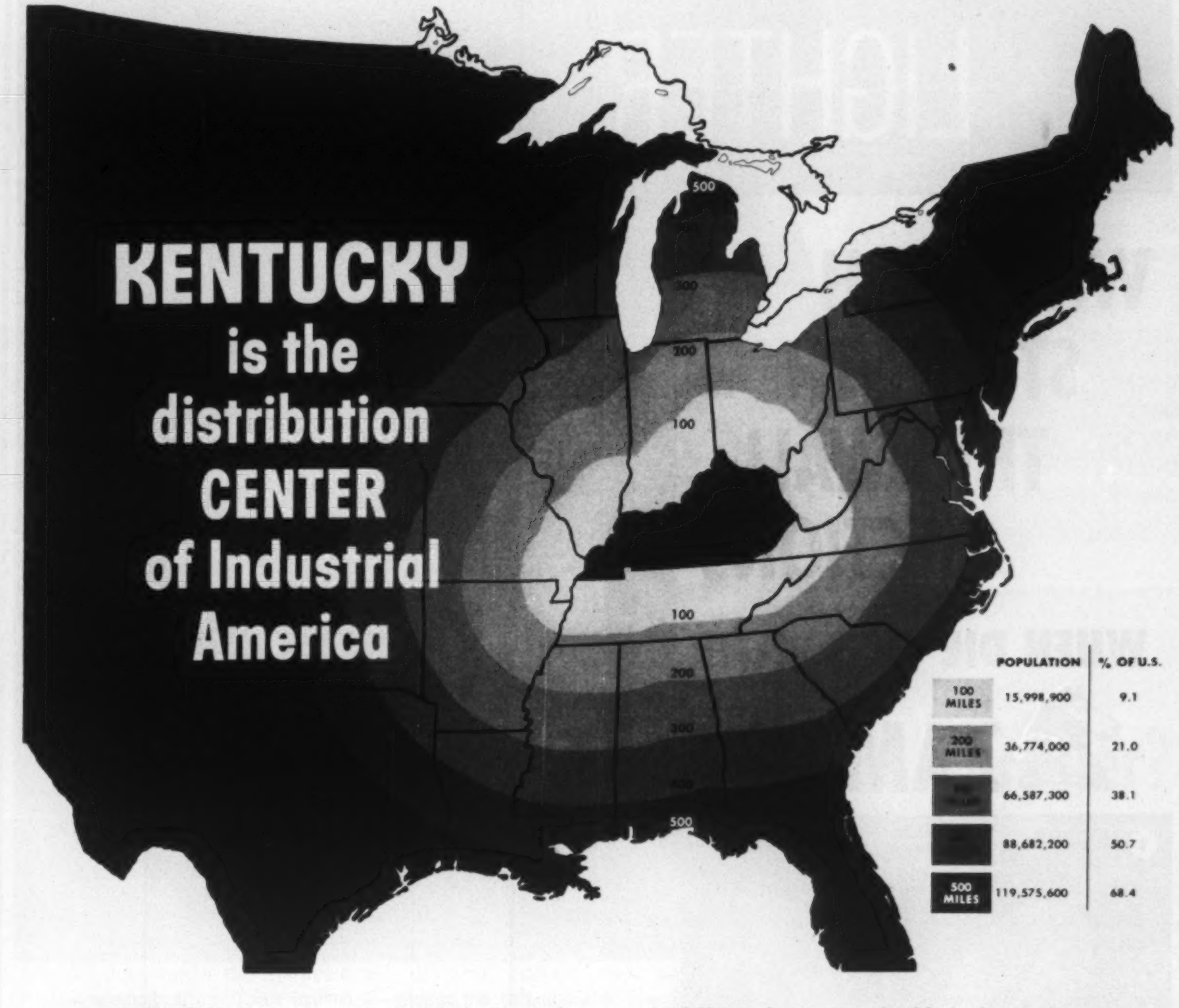
4. Offer products designed for longer service. Abandon costly frills and put money into quality components and higher production standards.

5. Offer products that represent good taste in design. Use designs that will be in good taste for three, four, or even five years.

Also watch out for these pitfalls. They can wreck any design research program:

- Crystal ball market research.
- Ignoring what the competition is doing.
- Determining what the product should look like on the basis of personal preference.
- Refusing to change a design concept in midstream.
- Inconsistency of "corporate image" in package and product design.

KENTUCKY is the distribution CENTER of Industrial America



	POPULATION	% OF U.S.
100 MILES	15,998,900	9.1
200 MILES	36,774,000	21.0
[illegible]	66,587,300	38.1
[illegible]	88,682,200	50.7
500 MILES	119,575,600	68.4

KENTUCKY is at the center of industry and consumption in America. Its northern boundary is mere *miles* south of the U. S. center of population. Its eastern border is a day's drive from the Atlantic—its western border is the Mississippi—its southern border looks down into the deep South. *68.4% of America's total population lives within 500 miles of this State.*

No other uncrowded area in the Nation is so close to so many customers—so close to so many of industry's raw materials and components.

These are some of the reasons why Kentucky industry is growing 43% faster than the U. S. average—is up to 135.1% from World War II, as compared with 94.5% for the U. S. as a whole.

And Kentucky WANTS the kind of growth your plant can help produce. Kentucky *people* want you—businessmen, workers, railroads, utilities and the State Government are surging with activities to make Kentucky more attractive and more *profitable* to you than any other state in the Union.

In recent years, more than half the companies who sent representatives to study the Kentucky facts *have since located new plants here*. Show us your distribution picture, and we will show you what Kentucky offers. *Address:*

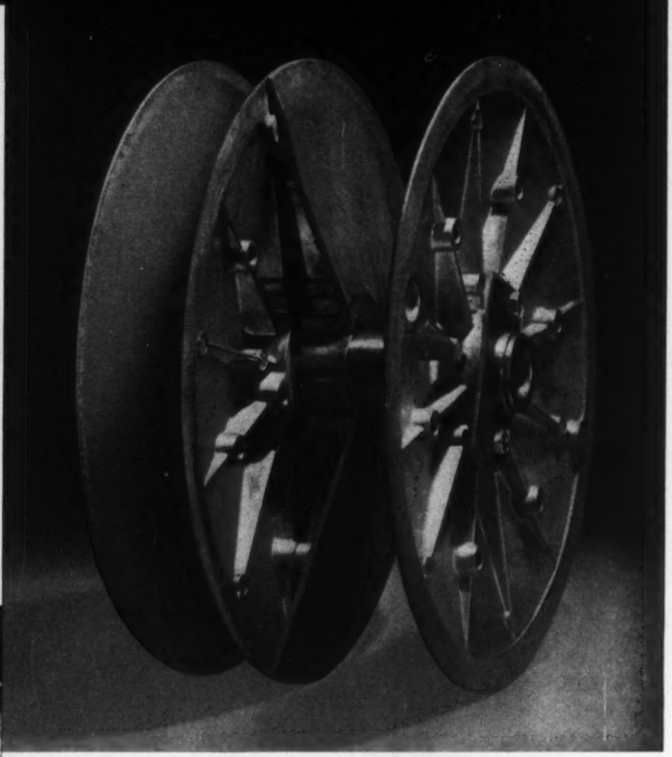
Lieutenant Governor Wilson W. Wyatt, or
E. B. Kennedy, *Commissioner*,
Department of Economic Development
800 State Capitol Building, Frankfort, Kentucky

COMMONWEALTH OF
KENTUCKY
WHERE BIG THINGS ARE HAPPENING

IT'S LIGHTER THAN YOU THINK!

WITH HIGH STRENGTH THIN-WALL SECTIONS

WHEN DIE CAST WITH ZAMAK



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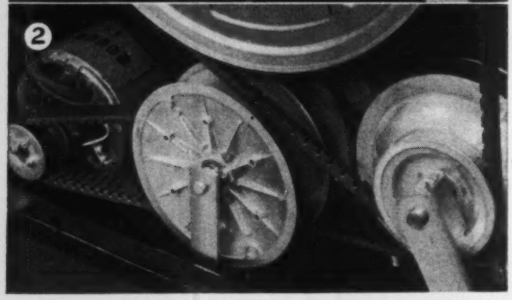

②

A single zinc die casting—a conical disk 7½" in diameter—used in four different positions, makes up this speed changer mechanism for the General Electric Combination Washer-Dryer.

Cast with hub and radial reinforcing ribs and a projection-recess interlocking system (see view above, with one disk cut away to show cross section) two of these parts are pressed, back to back, on a bronze bearing to form a movable drive ratio adjustment. Two single pieces, locked on the ends of the tube, complete the dual-pulley assembly.

In position 1 (at left), the mechanism provides a regulated low speed for washing, rinsing and drying cycles. Moved upright, as in position 2, the drive is changed from an 8 to 1 ratio for centrifuging speeds during the water-extracting cycle.

Zinc die castings, because of their high strength in thin-wall sections, their dimensional accuracy, smooth surface and low cost, are the logical and obvious answer to the problem of producing these heavy-duty appliance parts.

HORSE HEAD® SPECIAL ZINC AND HORSE HEAD ZAMAK ARE PRODUCED BY

THE NEW JERSEY ZINC COMPANY

DEVELOPERS OF THE ONLY STANDARD ZINC DIE CASTING ALLOYS IN USE TODAY

160 Front Street · New York 38, N. Y.

HORSE HEAD PRODUCTS ®

Lancer, Chrysler's new compact car, will be marketed through the Dodge Div.

Chrysler Corp. Car Production

1960*	1,092,000
1959	738,000
1958	581,000
1957	1,222,000
1956	870,000

Truck Production

1960*	74,000
1959	72,000
1958	58,000
1957	76,000
1956	91,000

*Anticipated.
Adapted from *Ward's Automotive Reports.*

Will 'Management Story' Hurt Chrysler?

IF AUTO SALES continue at their present rate, Chrysler Corp. should take 15 per cent of the market and realize net earnings of between $35 million and $40 million this year. Car and truck sales will be slightly over 1 million units. The company is tentatively programing 980,000 cars for the 1961 model run. About 35 per cent of its initial run will be compact cars. Minor price adjustments are expected when the cars are introduced.

One obvious stumbling block stands in the way of the company's plans. It is concerned about the widely reported story of alleged graft and corruption among top management, which was climaxed by the firing of William C. Newberg as president. Results of the investigation initiated by Chrysler board members are expected to be made public within a month. The feeling around motordom is that one or more executives may be asked to resign, but a major shakeup among top management seems unlikely.

Although there's little doubt among observers that more "conflicts of interest" exist at Chrysler than at other auto companies, it's difficult to build up proof to substantiate the claims made in lawsuits filed by Sol Dann, Detroit attorney and professional dissident stockholder. The suits are expected to be dropped or shunted into legal pigeonholes after investigation results are made public.

But Chrysler's concern is that continued exposure and charges—true or not—may turn public confidence against the company and drastically reduce its sales. If that doesn't happen, the firm stands a good chance to build more than 1 million cars and at least 70,000 trucks in calendar 1961.

Purchasing Looks Steady

L. L. Colbert, Chrysler's chairman and president, told STEEL that the company has disposed of the stockpiled steel it had left over from last year's steel strike. It's now booking orders into November, and like other automakers, it hopes to schedule purchases of materials on an orderly basis throughout the 1961 model run. Flat rolled inventories reportedly stand at 30 days or less. The company recently switched purchasing responsibilities of most of its buyers of materials. Although Chrysler doesn't say so, it's understood that the move was done partly as a result of "conflict of interest" charges.

The corporation last week canceled its plans to try out 10,000 aluminum bumpers—they were to be built via the extruded approach developed by Reynolds Metals Co. (STEEL, July 25, p. 89). Cost estimates turned in by potential fabricators did not match estimates presented by Reynolds, and the aluminum firm doesn't want to underwrite the tryout program, says Maurice Garwood, Chrysler's chief materials engineer.

Under investigation is a bumper

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with a thin stainless skin bonded to carbon steel with an adhesive. It's too soon to make a full cost or performance evaluation. The supplier firm is testing the bumper to see whether it will retain its bond under hot and cold shrink tests.

Despite industry talk, Chrysler will continue to use Type 18-8 stainless for wheel covers because it gets enough of a scrap price differential to make up for the slight premium paid for the material.

Aluminum Engine Released

Although Chrysler has made no official announcement, Alan Loofbourrow, director of engineering, admits the company will be putting its diecast aluminum engine into 10 per cent of its 1961, six cylinder output. The aluminum version of the company's 225 cu in. job will be some 200 lb lighter than the same engine cast in gray iron. Some 4000 have been built, and 15,000 are expected to be ready for installation shortly.

The slant six engines have a gray iron head. They'll go into Dart, Plymouth, Valiant, and Lancer cars on a random basis for customer reaction and field testing. The aluminum blocks will be marked with a special decal so dealers will be sure to put in the special antifreeze that's needed.

Chrysler is still working on a one piece, diecast aluminum head which it hopes will be ready for 1962 models. Most of the aluminum for the blocks will be supplied by Chryslum Ltd. of Canada.

Looking ahead, company engineers say Chrysler expects to switch to differentially coated galvanized steel for many of its under body parts for 1962 models. Problems with quality control of the water soluble body dip make galvanized steel seem like a better bet. Although there's a 12 cent premium on the zinc coated material, engineers say it will let them eliminate one or two undercoating operations, so final costs for this corrosion protection should be no higher than this year's.

As STEEL indicated earlier (Mar. 28, p. 65), the company is using an instrument cluster housing molded from acetal resin for its new compact car, the Lancer. It's also sourcing similar housings in magnesium for the Valiant. The aim is to make a model run cost comparison among the two lightweight materials and the 9 lb zinc diecast housings. Both the magnesium and Delrin housings weigh about 3 lb. Final piece price manufacturing costs are about equal, although Mr. Garwood says the magnesium does need extensive dip priming to seal surface pores prior to painting.

Chrysler is showing increased interest in magnesium, but engineers admit they're moving slowly because Dow Chemical Co., Midland. Mich., is the only major source of supply. Automakers generally shy away from single sourcing of any material or part because of the possibility of production shutdowns if a supplier is hit by a strike, or puts through an unexpected price change. Chrysler can afford to be more interested in magnesium because it's not tied as closely to aluminum as General Motors and Ford — they have molten metal contracts with the aluminum companies.

U. S. Auto Output

Passenger Only

	1960	1959
January	688.731	545.756
February	659,323	478.518
March	654,242	576.080
April	582.909	578,846
May	611.226	546.817
June	613,147	557,995
July	434.377	555,410
August	305,527	239,152
8 Mo. Totals	4,549,482	4,078,574
September		258,151
October		507,527
November		254,527
December		494,931
Total		5,593,707

Week Ended	1960	1959
Aug. 13	84,139	72,603
Aug. 20	47,437	31,848
Aug. 27	38,952	18,335
Sept. 3	51,647	17,261
Sept. 10	52,014†	24,364
Sept. 17	70,000*	62,716

Source: *Ward's Automotive Reports*.
†Preliminary. *Estimated by STEEL.

New Model Changes

The corporation has spent more than a quarter billion dollars to bring its 1961 models to market. Tooling and equipment expenditures for 1962 cars may reach $400 million.

Chrysler introduced its second compact car, Lancer, at its 1961 preview at Miami Beach, Fla. The car will be marketed through Dodge Div. Lancer is built on the Valiant body shell, but sports a different grille and taillights as identifying characteristics. The grille is stamped from Type 430 stainless steel. Other Chrysler cars (except Imperial) retain aluminum grilles. Imperial's grille is a zinc diecasting with double nickle plating.

Plymouth has the most definite styling changes. Its finless rear quarters give the line a flatter and slightly sloping rear end appearance. De Soto is using the Chrysler series body shell and sheet metal which is basically unchanged from last year's. It comes only in two and four door hardtop models in a single series. Dodge has dropped its Matador series and plans to concentrate on the Polara and Dart cars. The low priced Dart is taking almost 90 per cent of Dodge sales this year.

Imperial continues with separate ladder frame and body construction, although the frame side rails are wider and less deep, so the floor pan can be lowered about 2 in. Swivel seats have been dropped on most series, although they're still optional for a few of the Chrysler and Imperial cars and standard on the Chrysler 300G.

Alternators are now standard equipment on all corporation cars. With such volume, costs are no higher than those of the former direct current generator, say company engineers. They expect to lower costs even more as suppliers reduce the price of diodes which are the most expensive item in the alternator. When that happens, engineers believe the rest of the industry will begin to adopt the alternator. It's more efficient and provides a saving in unsprung weight.

Exhaust Note

Chevrolet's engineering laboratories are installing what's believed to be autodom's largest dynamometer console. Over 30 ft long, it will control two 600 hp, 8000 rpm and two 300 hp, 6500 rpm dynamometers.

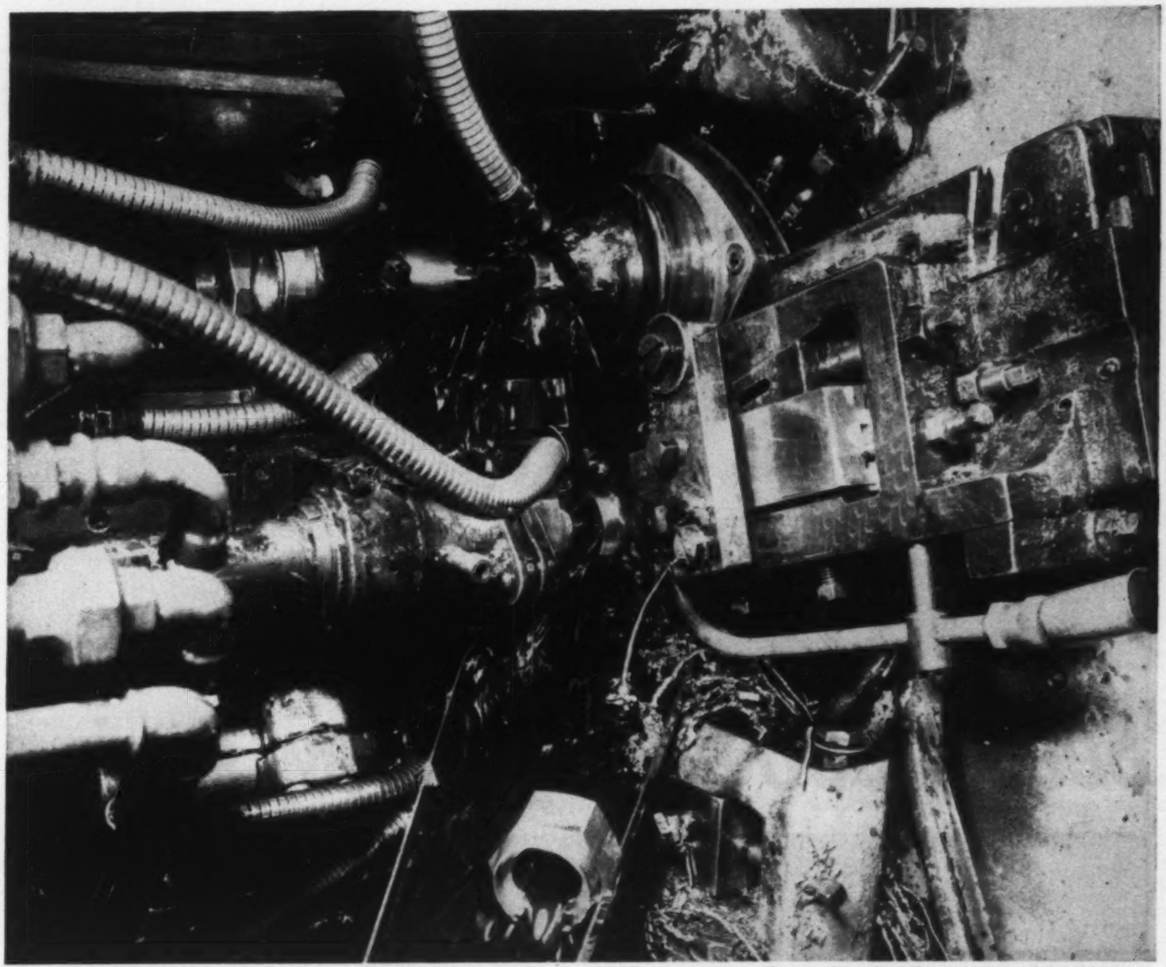

Photo courtesy Elastic Stop Nut Corporation of America

Nuts . . . ESNA makes millions of them from Aristoloy Electric Furnace Steel

Steel for self-locking hex nuts must be uniform in structure, easy to machine and free from internal and external defects. Elastic Stop Nut Corporation of America insists on these qualities . . . and gets them with Aristoloy cold finished bars.

Aristoloy Electric Furnace Steels, carefully controlled from melt shop to finishing operations, meet specifications for this and other applications requiring steel of uniform quality. For complete information about Aristoloy blooms, slabs, billets and bars, in carbon, alloy, stainless and leaded, call the Copperweld representative in your nearest large city . . . or write for NEW PRODUCTS & FACILITIES CATALOG.

ARISTOLOY STEELS

DIVISION OF
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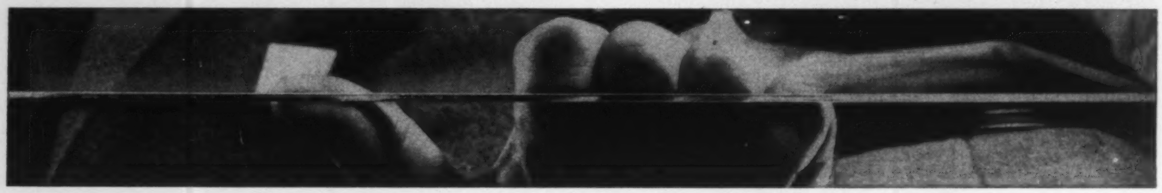
ARISTOLOY STEEL DIVISION • 4005 Mahoning Ave., Warren, Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

Sees $4500 annual screw saving



RB&W fastener survey uncovers use of special item which is replaceable by standard hex screw at much less cost

Of course you pay more for a "special" than a "standard" item—and that includes fasteners. So, when surveying a company's usage of fasteners, the RB&W Man looks sharply for the "specials"—and a valid reason for their use.

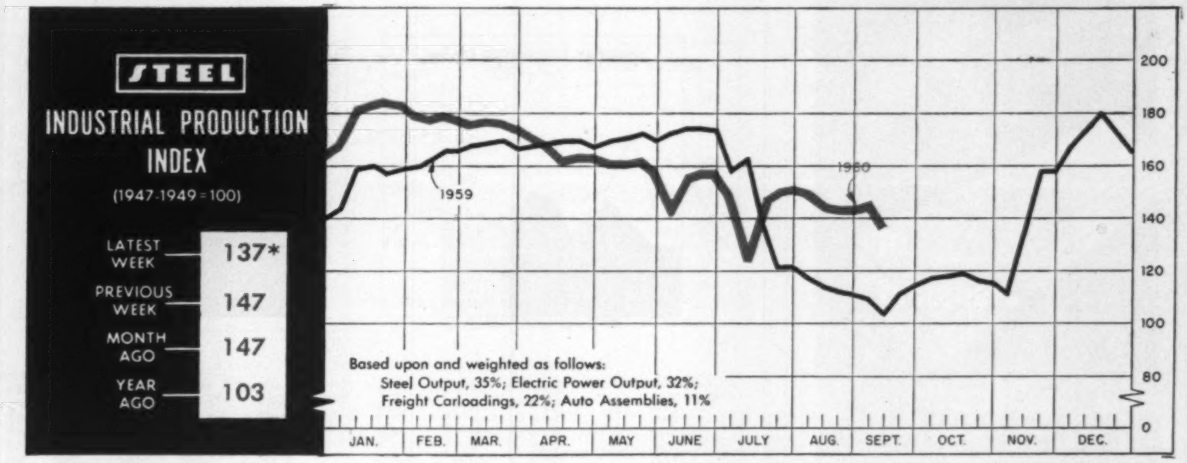
He could find no good purpose for the extensive use of screws with heavy head and milled body in one particular product. There was neither a specification requiring close fit in very close tolerance holes . . . nor were there exceptionally "sloppy" holes that called for an oversize head to span.

He therefore recommended assembly with standard RB&W High Strength Hex Screws. They would meet any physical requirement for the "special" being used . . . *but cost 30¢ less per unit.* Yearly total: $4500 more for *profits* instead of *costs.*

Are you *sure* you're not needlessly wasting dollars on fastener specifications? Let the RB&W fastener expert survey them. He's made proper fastener usage a science, is ready to cooperate with your engineers. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W
116th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Cleveland, Milwaukee; New Orleans; Denver, Fargo. **Distributors from coast to coast.**



Based upon and weighted as follows: Steel Output, 35%; Electric Power Output, 32%; Freight Carloadings, 22%; Auto Assemblies, 11%

*Week ended Sept. 10.

Fall Upturn May Be Late and Weak

MANY BUSINESSMEN are turning their optimism toward the longer term future, an almost sure sign that some of them have given up hopes for much of an upturn during the next few months.

The prospects for the next five years or so make comforting reading—increases ranging from 4 to 8 per cent in gross national product are in prospect, one survey shows. But the fact remains that 1960 has not measured up to expectations from the beginning, and it is not likely to at the ending.

• Slow Arrival — The industrial production index above (and others like it) will be a little slow in showing the fall upturn this year. And it is questionable whether the upturn will have the strength usually displayed. Two of the biggest factors associated with the fall pickup —steel production and auto output —are not meeting expectations.

David C. Elliott, vice president and economist for Cleveland Trust Co., points out that the normal gain in the Federal Reserve Board's industrial production index between August and October is a little more than 4 per cent. He points out that if the national steel operating rate climbs up to 70 per cent in that period (it is now about 52 per cent) it would constitute a more-than-seasonal climb. (However, it would still leave the industry operating far below the rate of the first and second quarters.)

• Plans Change—The 70 per cent rate may not come until November unless automakers and other major customers step up their steel buying soon. Motordom's schedules are being juggled, partly because of the recent railroad strike. But it is suspected that many of them welcomed the delays because of the high inventory of unsold 1960 models and the persistent lag in sales. Dealers' stocks on Sept. 1 were down to 887,800 units compared with 1,062,000 on Aug. 1, says *Ward's Au-*

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,503[1]	1,401	356
Electric Power Distributed (million kw-hr)	14,200[1]	14,941	13,109
Bituminous Coal Output (1000 tons)	7,600[1]	7,790	7,345
Crude Oil Production (daily avg—1000 bbl)	6,830[1]	6,824	6,813
Construction Volume (*ENR*—millions)	$427.2	$406.4	$345.1
Auto, Truck Output, U. S., Canada (*Ward's*)	66,810[1]	66,648	37,287
TRADE			
Freight Carloadings (1000 Cars)	505[1]	577	481
Intercity Truck Tonnage (changes from year ago)	+0.4%	−2.9%	+41.4%
Business Failures (Dun & Bradstreet)	288	315	308
Currency in Circulation (millions)[3]	$32,174	$31,980	$32,107
Dept. Store Sales (changes from year ago)[3]	−1%	+4%	+20%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$21,221	$23,635	$18,314
Federal Gross Debt (billions)	$288.7	$288.6	$290.2
Bond Volume, NYSE (millions)	$15.9	$20.0	$27.3
Stocks Sales, NYSE (thousands of shares)	10,852	14,952	11,139
Loans and Investments (billions)[4]	$104.9	$104.4	$103.7
U. S. Govt. Obligations Held (billions)[4]	$27.4	$27.2	$29.1
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	230 0	230.3	222.6
All Commodities[7]	119.4[1]	119.4	119.4
Commodities Other than Farm & Foods[7]	128.3[1]	128.3	128.3

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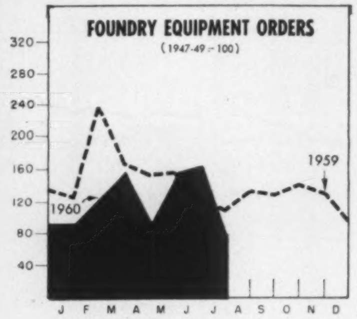
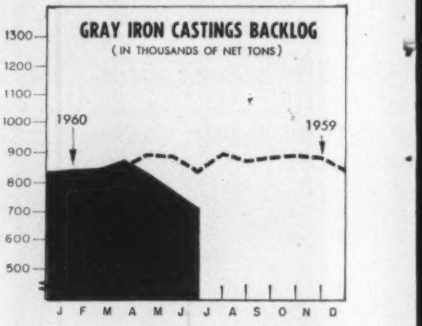
*Dates on request. [1] Preliminary. [2] Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3] Federal Reserve Board. [4] Member banks, Federal Reserve System. [5] 1935-39=100. [6] 1936-39=100. [7] Bureau of Labor Statistics Index, 1947-49=100.



	1960	1959	1958
Jan.	95.5	127.4	57.9
Feb.	128.6	237.1	57.6
Mar.	159.9	166.6	85.9
Apr.	97.9	154.2	88.7
May	159.0	157.0	136.1
June	164.8	125.1	87.7
July	80.0	110.7	77.9
Aug.	....	134.1	74.1
Sept.	....	131.3	64.5
Oct.	....	140.8	118.9
Nov.	....	131.2	83.3
Dec.	....	95.9	137.0
Avg	....	142.6	89.1

Foundry Equipment Mfrs. Assn.
Charts copyright, 1960, STEEL.



	Shipments		Unfilled Orders*	
	1960	1959	1960	1959
Jan. ...	1,136	1,002	851	687
Feb. ...	1,108	1,037	855	767
Mar. ...	1,143	1,205	880	847
Apr. ...	1,051	1,246	834	892
May ...	1,053	1,236	782	885
June ...	1,050	1,252	716	838
July ...	....	933	...	898
Aug. ...	....	743	...	873
Sept. ...	....	850	...	883
Oct. ...	....	872	...	887
Nov. ...	....	831	...	885
Dec. ...	....	1,108	...	846
Total ..	....	12,315		

*For sale. U. S. Bureau of the Census.

tomotive Reports. That is well above midsummer hopes.

• **Ample Evidence** — There are other indications that the upturn may be late and lacking in normal strength. New orders continue to weaken. In durable goods industries (where most of the uncertainty seems to be centered), orders declined in July, the fourth drop in five months since the 1960 high was reached in February. Shipments are also dropping—but not as fast as incoming business. Result: Backlogs are dwindling fast.

Employment declined in August, contrary to the normal pattern, and unemployment showed less of a decline than usual. Overtime, which some analysts feel is a sensitive barometer, also dipped.

Even retail sales, which have been strong most of the year, are beginning to weaken. Department store sales in the latest period dipped below the year ago level for the third time in the last five weeks.

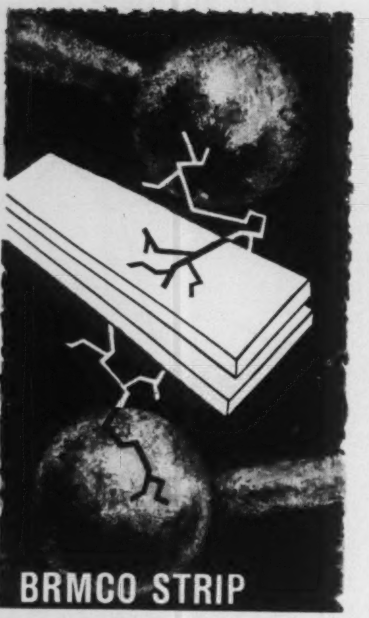
Profits are being squeezed, injecting caution into business planning. It is reflected in the further downgrading of expenditures for new plant and equipment. The Securities & Exchange Commission reports a leveling off in the last two quarters of 1960. (In the past, plant and equipment has often been the last important factor to taper off prior to a dip in the economy.)

Important business indicators are turning more bearish with each month. In early September, only four of ten trend leading indicators were pointing up, reports Prentice-Hall Inc., Englewood Cliffs, N. J. Of 20 trend-coincident indicators, only eight were up.

Pattern: Rolling Adjustment

Another strong indication that the fall upturn will not be as strong as it has been in some years: The economy is acquiring more and more the characteristics of a rolling adjustment, and such a pattern almost always mitigates swings either way. As Dr. John W. Harriman, economist for Broad Street Group of Mutual Funds, New York, puts it: "The economy is not moving strongly upward, but rather along an uneven and uneasy plateau. It is uneven because there are substantial variations in the behavior of different categories, uneasy because premonitory symptoms of possible recession can be observed."

Example of this behavior between industries: Prentice-Hall estimates



CUSTOMER REPORTS
246 ORDERS RECEIVED / 000 ORDERS REJECTED

An electrical components manufacturer, with exacting material requirements, received 246 orders from BRMCO last year . . . without rejecting a single pound of material.

This example, typical of BRMCO's service to all customers, points out BRMCO's ability to produce and deliver strip aluminum, brass, and bronze to meet the most rigid specifications . . . every time, on time. It also indicates the value of BRMCO's custom packaging, which protects the metal from damage, besides economizing on storage space and making in-plant handling easier.

Check into the many advantages of specifying BRMCO Strip . . . not the least of which are "Specific-Date" delivery and reduced material costs.

Write or phone today, without obligation. If you phone, call EDison 7-4434 (Bridgeport—collect) and ask for Larry Hayden, field service department.

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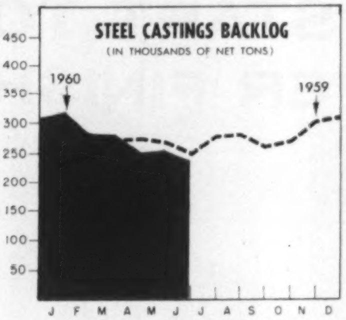
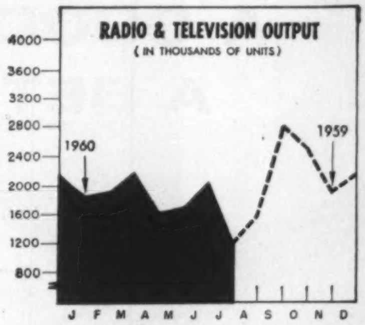
Bridgeport Rolling Mills Company
BRIDGEPORT, CONNECTICUT
Subsidiary of Atlantic Coast Industries, Inc.



	Shipments		Unfilled Orders*	
	1960	1959	1960	1959
Jan. ...	122.6	105.4	314.2	232.6
Feb. ...	129.3	110.3	279.7	245.1
Mar. ...	143.7	131.3	278.0	270.7
Apr. ...	127.2	134.3	248.9	271.6
May ...	126.6	135.4	252.3	264.0
June ...	137.0	143.6	233.8	248.8
July ...	....	106.5	....	274.1
Aug. ...	....	98.0	....	279.3
Sept. ...	....	99.7	....	256.9
Oct. ...	....	105.6	....	268.9
Nov. ...	....	109.5	....	301.9
Dec. ...	....	133.3	....	306.3
Total ..	....	1,412.9		

*For sale. U. S. Bureau of the Census.



	Radio		Television	
	1960	1959	1960	1959
Jan. ...	1,356	1,125	526	437
Feb. ...	1,442	1,125	503	460
Mar. ...	1,668	1,348	550	494
Apr. ...	1,230	1,040	423	389
May ...	1,277	1,040	442	432
June ...	1,551	1,430	519	571
July ...	890	829	269	350
Aug. ...	....	1,009	...	547
Sept. ...	....	1,981	...	808
Oct. ...	....	1,796	...	707
Nov. ...	....	1,346	...	561
Dec. ...	....	1,553	...	593
Totals ..	....	15,622	...	6,349

Electronic Industries Association.

that factory sales of office equipment this year will top the 1959 level by 15 per cent. But makers of furniture saw shipments slip below the corresponding year ago level for the first time in July. Orders lag the year ago figure by 6 per cent, and increasing cancellations indicate things will get worse.

Examples of erratic behavior within industries: After booking the best orders since 1957 in both May and June, manufacturers of foundry equipment slumped in July to the lowest level since the 1958 recession. (See graph and table, Page 116.) In a survey of 256 foundrymen early this month, The Gray Iron Founders' Society Inc. found such divergent views as: "Things look good here (August was largest month in history)." vs. "In 50 years of business, we have never experienced such a depression as this year."

Example of diverse trends geographically: In the sixth Federal Reserve District (Alabama, Florida, Georgia, Louisiana, Mississippi, and Tennessee) 12 of 15 seasonally adjusted business indexes reported by the Federal Reserve Bank of Atlanta for July were better than or equal to the January level. But the seasonally adjusted index of business activity for the Pittsburgh district has been in a steady decline since the second week of January and now rests at only 86 per cent of the 1947-49 average.

Basic Strength Persists

But there is still plenty of strength in the over-all economy which has resulted in stability in the face of some pretty steep "internal" declines. As the First National City Bank of New York points out, the index of iron and steel production has declined more than one-fourth since February, but an "offsetting upward movement has been broadly distributed among both durable and nondurable goods industries—a classic pattern of 'rolling readjustment.' "

Furthermore, Prentice-Hall says there is a "dissenting optimistic group" which feels that there will be no recession in 1960-61 because we have already had it in 1959-60. Reasoning: 1. The drop in production resulting from last year's steel strike. 2. This year's inventory correction. 3. The significant slump in housing since mid-1959. This group sees the low point in the current quarter, with a gradual rise in business from now into 1961.

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for
industry . . .

it's dependability that counts!

Yes, *life* often rests on the dependability of the fastener.

Whether for bridges, pressure piping, skyscrapers, railroads, transformers or tunnels . . . or even your personal car, it's the *dependability of the fastener* that counts. The fastener must be *stronger . . . more dependable* than the part.

When you visit our manufacturing facilities and control laboratories, you will see for yourself how we build dependability into our IMPACT-FORM'D nuts, bolts and screws.

IMPACT-FORM'D Screw and Bolt fasteners are produced to customer demand every day:

- free—or interference-fit rail bolts
- high strength heat treated bolts for heavy construction
- close tolerance components for machinery
- screws for electronic equipment and accessories

Whether you follow industry standards or have your own specifications, IMPACT-FORM'D Screw and Bolt fasteners have the *dependability* you need.

VMA 6997

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Pittsburgh 30, Pa

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American Equipment

America's Most Complete Line of Industrial Fasteners

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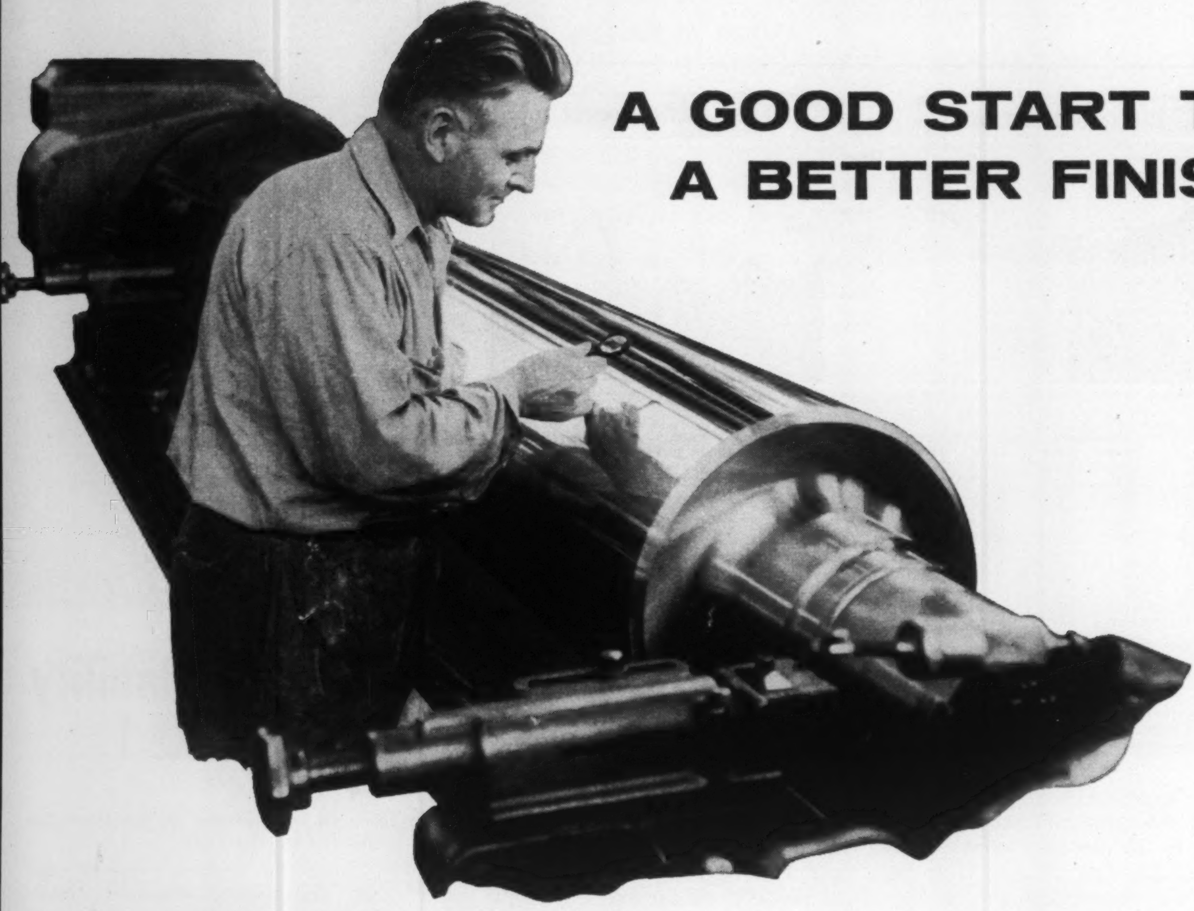

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VACUUM MELTED FINISHING ROLLS

Here are the rolls which have cut repolishing time in half . . . lasted 33% to 50% longer on the mill between grinds . . . produced a finer finish using same polishing procedure as competitive rolls. They are made from consumable electrode, vacuum arc melted Midvac Steels with super uniformity of fine grain structure . . . and have maximum freedom from defects and non-metallic inclusions. The exclusive Micro Lustre* finish of these rolls assures rolling free of surface imperfections . . . quicker repolishing . . . longer trouble-free service between grinds.

If you are rolling stainless steel, aluminum foil, brass, precious metals or any other high finish product specify Midvac Rolls for longer runs and lower operating costs. Write for complete data on these rolls and the new roll hardness selector chart.

MIDVALE-HEPPENSTALL COMPANY
NICETOWN, PHILADELPHIA, PA.
Subsidiary of HEPPENSTALL COMPANY, Pittsburgh, Pa.

MH *Midvac Rolls*

*Trademark

EUGENE P. BERG
Bucyrus-Erie exec. v. p.

WILLIAM G. BROWN
Seymour Mfg. v. p.-sales mgr.

CHARLES E. SCHWAB
heads Bunker Hill Co.

HORACE FROMMELT
heads Ferro research

Eugene P. Berg was elected executive vice president, **Bucyrus-Erie Co.**, South Milwaukee, Wis. He was general manager-Chicago operations of Link-Belt Co.

William G. Brown, former works manager, was promoted to vice president and sales manager of **Seymour Mfg. Co.**, Seymour, Conn.

Virgil Steinmeyer, Eastern regional sales manager for **Electric Autolite Co.'s** Wire & Cable Div., Port Huron, Mich., was named product manager for the division. **Thomas B. Murchie** was made product manager for Autolite's Industrial Instrument Div. in Port Huron.

Joseph H. Schellman was elected a vice president of **Controls Co. of America**, Schiller Park, Ill. In addition to corporate responsibilities, he continues to have as his major assignment the post of general manager of the newly formed Control Switch Div. (merger of Electrosnap Corp. and Hetherington Inc.).

Carleton M. Sloat was made works manager, **Morris Machine Works**, Baldwinsville, N. Y.

Robert Hamilton was named president, **Dayton Precision Mfg. Co.**, Dayton, Ohio, subsidiary of Hoover Ball & Bearing Co. He succeeds **Frank L. Arnold,** resigned.

Bert F. Whitbread, Eastern division sales manager, J. I. Case Co., was appointed sales manager of the newly organized Construction Equipment Div. of **Minneapolis-Moline Co.,** Hopkins, Minn.

Charles E. Schwab was appointed president and chief executive officer of **Bunker Hill Co.,** San Francisco, to succeed the late **John D. Bradley.** He has been general manager of the Kellogg, Idaho, operations since the first of the year, and was named a vice president Apr. 1. As president, he continues headquarters in Kellogg. **Emmett G. Solomon,** vice president, was named chairman.

Stanley C. Adamek was appointed vice president - operations, **Pheoll Mfg. Co. Inc.,** Chicago.

E. Lincoln Van Sickel joined **Penn Machine Co.,** Pittsburgh, as assistant to the executive vice president. He was a Pittsburgh representative of Tool Steel Gear & Pinion Co.

George A. Pyle was named assistant manager, Manufacturers Product Sales Dept., **American Steel & Wire Div.,** Cleveland, U. S. Steel Corp. He is succeeded by **Charles W. Meyers** as manager of stainless steel product sales.

John R. Englehorn joined **St. Joseph Lead Co.,** New York. In addition to metal sales and raw material procurement, his duties include new product evaluation, financial planning, and statistical analysis. He was manager, Metal & Ore Dept., American Zinc, Lead & Smelting Co.

Greist Mfg. Co., New Haven, Conn., elected **Merritt D. Vanderbilt** to the new post of chairman. He is succeeded as president by **H. Stuart Stone Jr. Hubert M. Greist** was made executive vice president.

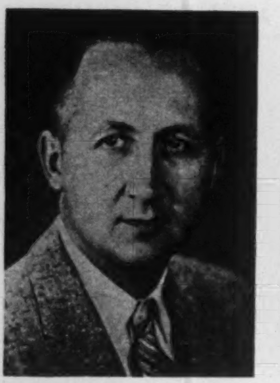
Horace Frommelt was appointed director of manufacturing research for **Ferro Powdered Metals Inc.** He is on a special assignment for Ferro in Springfield, Mass., and will move to the company's main office in Salem, Ind., later this year.

Neil K. Barr was made technical manager, Electrical Conductor Div., Newark, Ohio, **Kaiser Aluminum & Chemical Sales Inc.** He was chief engineer of the division. **John B. Roche** was named chief engineer for overhead conductor products; **Roger S. Keith** chief engineer for insulated products.

Howard M. Wiley succeeds **Barclay C. Knerr,** retired, as construction manager of **Consolidated Western Steel Div.,** Los Angeles, U. S. Steel Corp. Former construction superintendent, Northern area, Berkeley, Calif., he is succeeded by **Stanley R. Farwell,** former Los Angeles district construction superintendent.

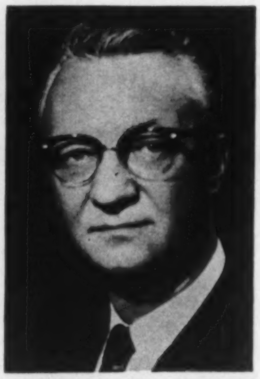
Edwin G. Drewry was named manager of the Phoenix, Ariz., extrusion plant of **Reynolds Metals Co. James M. Hairston** was made plant superintendent. **R. V. Bobb,** acting manager of the plant, returns to company headquarters at Richmond, Va., to resume former duties as assistant general manager, Extrusion Div.

Henry Wardwell was elected president, **Burnside Steel Foundry Co.,** Chicago. He succeeds the late **H. F. Wardwell,** president and founder of the company. **Frank B. Powers** was elected executive vice president and treasurer; **Walter W.**


HENRY M. CROSSEN
Clearing Div. mfg. v. p.

ROLAND L. GUERIN JR.
BMW Mfg. sales manager

M. CLAUDE SCHULER
Bostitch div. gen. mgr.


F. STAN ROMANSE
B&W Boiler Div. purchasing

Moore vice president and works manager; **J. D. Donahue,** secretary-controller.

Henry M. Crossen was appointed vice president-manufacturing, **Clearing Div.,** Chicago, U. S. Industries Inc. He was director of manufacturing. **T. Singeles,** former advertising vice president of U. S. Industries, was named vice president of marketing services for Clearing.

John W. Johnson transfers from Michigan City, Ind., to Dallas as manager of **Joy Mfg. Co.'s** Oil Field Compressor Sales Dept. He formerly headed the Process & Chemical Application Section, Reciprocating Compressor Dept.

M. J. Helmich succeeds **W. R. Crooks,** retired, as chief engineer of the Development Div. of **Cooper-Bessemer Corp.,** Mt. Vernon, Ohio. **G. A. Dorton** replaces Mr. Helmich as assistant chief development engineer. Mr. Crooks will continue with the corporation as development consultant.

Roland L. Guerin Jr. was made sales manager, **BMW Mfg. Inc.,** Torrance, Calif. He previously served as sales manager for U. S. Industries Inc.'s Clearing and Western Design Divisions, and as director of special products with Hufford Corp.

M. Claude Schuler was made general manager, **Bostitch Stapling & Stitching Div., Bostitch Inc.,** East Greenwich, R. I. He was national sales manager.

George A. Hach was made sales manager-nonferrous metals, Central Foundry Div., **General Motors Corp.,** at Saginaw, Mich.

A. Earl Lee was made marketing co-ordinator of **J. I. Case Co.,** Racine, Wis. He was with Massey-Ferguson in Toronto, Ont.

William C. Stewart joined **J. Bishop & Co. Platinum Works,** Malvern, Pa., as manager of the Mechanical Div. He was with SKF Industries Inc.

F. Stan Romanse was named purchasing agent, Boiler Div., **Babcock & Wilcox Co.** He is in Barberton, Ohio, and succeeds **J. R. Connell,** who resigned to join the executive staff of Jessop Steel Co. and subsidiaries.

Trans-Weigh Co., King of Prussia, Pa., appointed **Branin A. Boyd** chief electrical engineer, a new post. He was head of the Electronic Dept., Tatnall Measuring Systems, a division of Budd Co.

D. P. Dorman was made Western sales manager, Hollywood, Calif., for **Cleveland Process Corp.** He was sales representative in Southern California for Clepco's products.

Edgar W. Clark joined **Eaton Mfg. Co.,** Cleveland, as director of marketing research to succeed **Sydney E. Cowlin,** resigned. Mr. Clark was president of Clark Marketing Co. in Cleveland.

Paul T. Persons joined **Stauffer-**

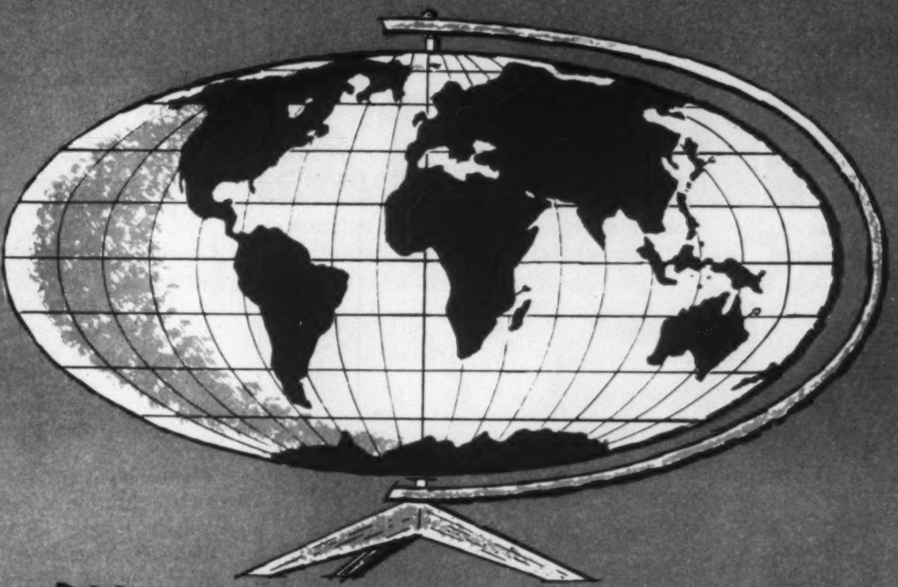
M. J. HELMICH
Cooper-Bessemer post

A. EARL LEE
J. I. Case marketing

WILLIAM C. STEWART
joins J. Bishop & Co.

EDGAR W. CLARK
Eaton marketing research dir.

Throughout the World....



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Greatest over-all return for your investment

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Alliance
machine company
Main Office • Alliance, Ohio

ANNE D. REPKO
Howe Sound purchasing post

PAUL H. STUFF
president of Ross-Meehan

CHARLES E. PETERSON
Mackintosh-Hemphill mgr.

WILLIAM BAILEY III
Jackson Industries v.p.

RICHARD E. RASSEL
Bliss automotive press sales

THOMAS J. AULT
heads Budd's Automotive Div.

Temescal Co., Richmond, Calif., as assistant general manager.

William Bailey III was named vice president-sales, **Jackson Industries Inc.**, Birmingham. He was assistant sales manager of Stamco Inc.

Richard E. Rassel fills the new post of manager of automotive press sales at **E. W. Bliss Co.**, Canton, Ohio. He is in Detroit.

Robert L. McGrath was appointed director of production control for General Dynamics Corp.'s **Stromberg-Carlson Div.**, Rochester, N. Y. He was production manager, Utica, N. Y., Div., Bendix Corp.

R. John Hess was made manager of metalworking equipment at Farrel-Birmingham Co.'s **Watson-Stillman Press Div.**, Rochester, N. Y.

Robert T. Cavanagh was appointed general manager of **Philips Electronic Instruments Div.**, Philips Electronic & Pharmaceutical Industries Corp., Mt. Vernon, N. Y.

Thomas J. Ault was appointed president of the Automotive Div. of **Budd Co.**, Detroit. He served Borg-Warner Corp. for 23 years in various executive capacities, and resigned in 1958 to become president of Saco-Lowell Shops, Boston. **S. A. Mahan Jr.** was made general manager of the Automotive Div., responsible for production of all automotive products and components at Budd's four major plants. Since 1957, he has been plant manager at Hunting Park, Philadelphia, and recently assumed similar responsibility for the division at Red Lion plant, Philadelphia.

Lee Tarricone was made sales manager, **General Kinetics Corp.**, Englewood, N. J.

Alfred M. Esberg was appointed general manager, **Greer Hydraulics Inc.**, Los Angeles, and chairman of the newly established executive committee. The vacancy created by resignation of **John F. Cain** as president will remain unfilled for the present.

Anne D. Repko was made assistant to the vice president of marketing at **Howe Sound Co.**, New York, responsible for procurement of primary and scrap metals. Miss Repko was purchasing agent for Austenal Co., a division.

Paul H. Stuff was elected president of **Ross-Meehan Foundries**, Chattanooga, Tenn. Formerly chief metallurgist, he advanced to executive vice president in 1958. **J. E. Whitaker**, chairman, has been acting president since July, 1958.

Charles E. Peterson was named division manager in charge of the **Mackintosh-Hemphill Div.**, E. W. Bliss Co., Pittsburgh. He succeeds **J. R. Patterson** as chief executive of the division. Mr. Patterson recently was elected president and chief executive of E. W. Bliss.

Walter Hanstein Jr. was made associate director of engineering, **Burroughs Corp.**, Detroit. He was manager, Machines Research Dept., at Burroughs' Paoli, Pa., research center. **Paul S. Mirabito** was made vice president in charge of the company's defense contracts organization.

A. T. Zodda, vice president-operations, International Div.; and **Fred J. Stock**, vice president-marketing, Squibb Div., were appointed corporate vice presidents of the parent company, **Olin Mathieson Chemical Corp.**, New York.

OBITUARIES . . .

Walter P. Schmitter, 62, engineering vice president of **Falk Corp.**, Milwaukee, died Sept. 5.

Irving Mack, 54, vice president, **Elastic Stop Nut Corp. of America**, Union, N. J., died Sept. 5.

John H. Castor, vice president-general manager, **Ajax Iron Works**, Corry, Pa., died Sept. 1.

C. F. Wentworth, Pacific Coast manager, Metal Industries Div., **Diversey Corp.**, died recently in Los Angeles.

Daniel C. Mills, 62, manager of industrial relations for **Bethlehem Steel Co.**, Bethlehem, Pa., died Sept. 7.

Anneal 430 Trim Stock and All Other Stainless Strip to a Durable, Mirror Finish *Without Chrome Depletion* in

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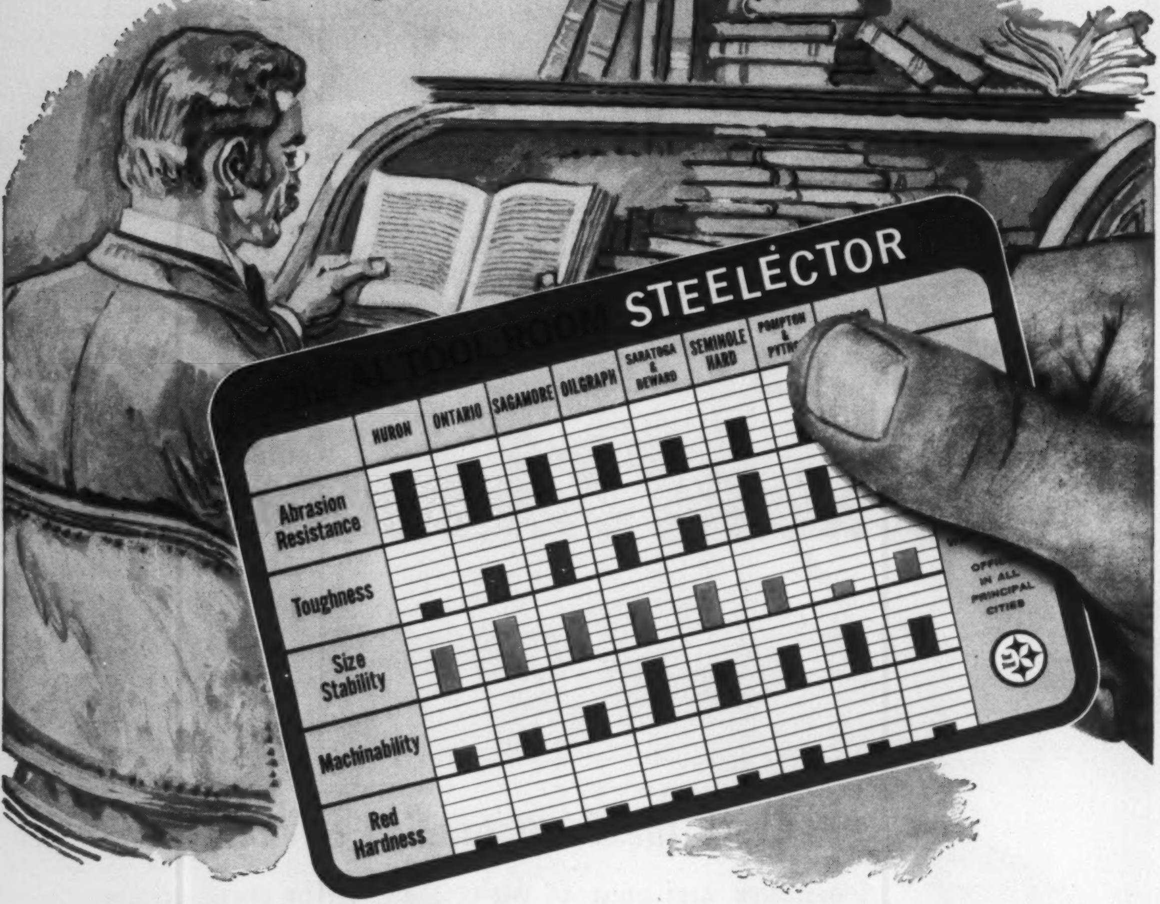
Still using the gay nineties approach—to Tool Steel?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ONTARIO
SAGAMORE
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Use the New, Modern A-L Steelector System

Now you can accurately select the proper tool steel based on its individual characteristics and be sure that it's available for off-the-shelf delivery before you place your order.

The new Allegheny Ludlum STEELECTOR Program makes tool steel selection fast. And it eliminates the embarrassment of specifying a grade which later turns out to be unavailable or available only after a costly delay.

The leading grades of tool steel that meet 96 percent of all applications—as listed in the Allegheny Ludlum Tool Steel Handbook—form the basis of the STEELECTOR Program. The STEELECTOR Grades are charted on cards covering each group of steels (tool room, hot work, and high speed grades) to help you select the particular grade best for your application.

Bar graphs on each STEELECTOR Card show how the various grades compare in abrasion resistance, toughness, size stability, machinability and red hardness. It's easy to determine accurately the combination of properties that best suits the job at hand.

The complete necessary range of sizes and shapes is listed in a special Data Stock List for every grade. These lists also include heat treating, typical working hardnesses and other data to insure that your selection is correct.

You can choose with confidence because every STEELECTOR grade has been selected from the complete line of Allegheny Ludlum Tool Steel and made under the rigid quality control standards of all A-L products.

For a complete explanation of the STEELECTOR Program, ask your Allegheny Ludlum sales representative for a copy of the colorful A-L Tool Steel STEELECTOR Booklet, or write: *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania. Address Dept. S-9-2.*

STEELECTOR
PROGRAM

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Tool Steel warehouse stocks throughout the country

2083

Algoma Steel to Install Six Stand, Wide Strip Mill

ALGOMA STEEL CORP. LTD., Sault Ste. Marie, Ont., is building a six stand, wide strip mill as an extension to its bloom and plate mill. Estimated cost: $30 million. It will be the first rolling mill of this type of Canadian manufacture and "is another step in rounding out our facilities," says D. S. Holbrook, president.

The mill is scheduled to be in operation in 1963. It will produce hot rolled steel sheets and light plates to a maximum width of 96 in., compared with 28 in. on present Algoma equipment.

The installation constitutes another step in the corporation's plans for diversification of its products.

The mill is expected to become a major supplier of sheet steel to the Canadian automotive industry which now imports all of its body stampings from the U. S. Announcement of the new mill is welcomed also in the household appliance industry.

"Any new source of supply is a good thing for our business," says George Dickson, plant manager, General Steel Wares Ltd., Toronto, Ont. "We see a growing business in water heaters and an increase in their size. I can see us requiring sheets 60 to 70 in. wide."

Imports of sheet steel and light plates from 12 countries last year totaled more than $41 million. In addition, Canadian automakers imported an estimated $80 million worth of body stampings.

Contract for the mill was placed with Dominion Engineering Co., Montreal, Que. The mill installation, with associated equipment, requires 9000 tons of machinery with six main driving motors totaling 35,000 hp and auxiliary drive motors totaling over 10,000 hp. The mill will require 240,000 sq ft of new buildings.

Operates New Temper Mill

A new temper mill has gone into operation in the Stainless Dept. at Gary (Ind.) Sheet & Tin Mills, U. S. Steel Corp. The mill was built and designed by E. W. Bliss Co.'s Rolling Mill Div., Salem, Ohio, to handle coiled strip up to about 50 in. wide and as narrow as 25 in. It is used to temper stainless gages between 0.016 in. and 0.140 in.

Another Bliss temper mill serves as a key unit in Gary Sheet & Tin's new, continuous, pickling line. Hot rolled coils are welded together and passed through the new Bliss mill which is ahead of the pickling section. The temper mill will break the oxide, accelerating the pickling operation. Strip handled ranges up to 60 in. in width in thicknesses between 0.059 and 0.187 in.

U. S. Steel also has modernized a continuous plate quenching and tempering line at its Homestead, Pa., Works. The line will process plates, sheets, and strip in flat form only. Tentative size limits: Thickness, 1/10 to ¾ in.; width, 15 in. minimum to 96 in. maximum; lengths, up to 360 in. U. S. Steel can now furnish a full range of flat, high yield strength products in the quenched and tempered condition.

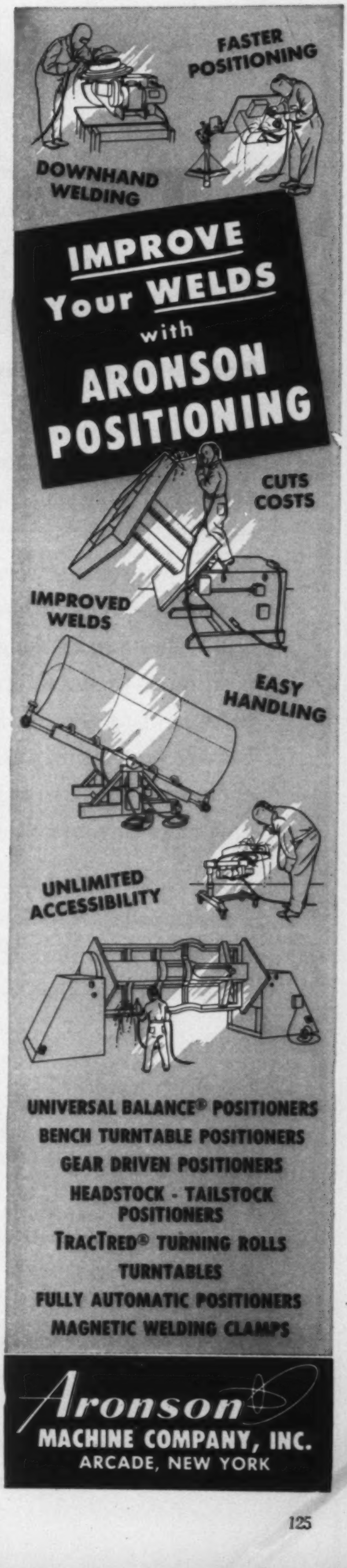
Cowles Buys Promat Div.

Cowles Chemical Co., Cleveland, purchased the Promat Div. of Poor & Co., Chicago. Promat produces metal finishing specialty chemicals, including electroplating additives, brighteners, and metal coloring processes. Cowles makes chemicals and chemical specialties, including metal cleaners, zinc phosphate coatings, and other metal treating chemicals.

Enters Fabricating Field

Carmel Steel Products has been organized in Downey, Calif., to manufacture steel framed, sliding, glass doors; steel window walls; and related architectural steel products. The company has purchased from Arcadia Metal Products, Fullerton, Calif., its entire line of steel framed, sliding, glass doors; inventory of

(*Please turn to Page* 128)



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The presses illustrated here are representative of the complete line of hydraulic presses and valves produced by R. D. Wood Company. All of those shown are available in various capacities and others are available for different operations. Write to R. D. Wood Company for recommendations on the press to suit your specific problem.

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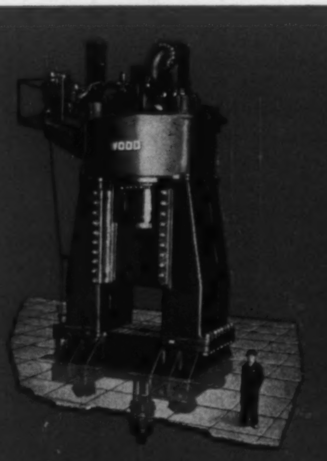
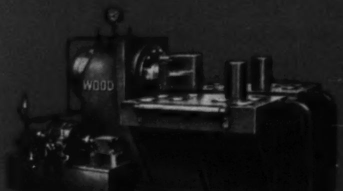
PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA

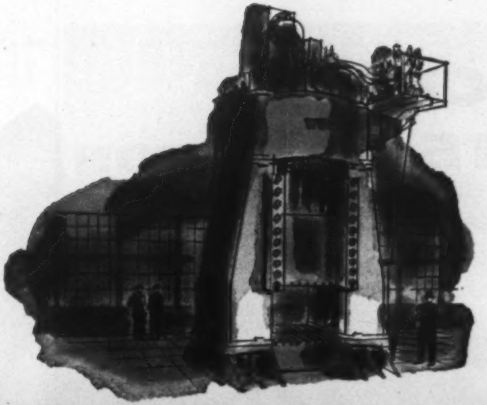


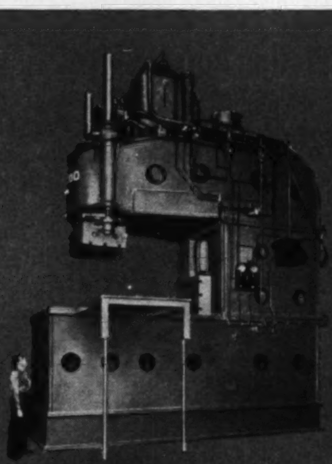
For Forging and Cogging Operations—Machine Number 8439, down-working hydraulic press. Capacity, 3,000 tons; platen size, 4'0"x5'0"; ejector ram, 51 tons; stroke of main ram, 3'0"; height of press, 31'11"; floor space, 9'6"x13'1".



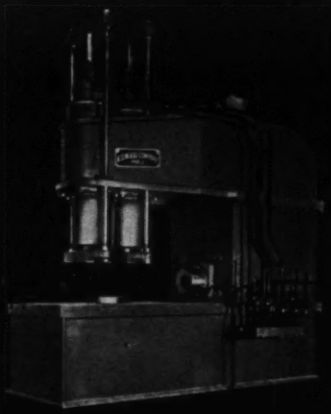
For Bending and Straightening Operations—Machine Number 8441, complete with integral pumping system. Capacity, 200 tons; stroke, 12"; table size, 4'4" x 6'0".

LOOK!

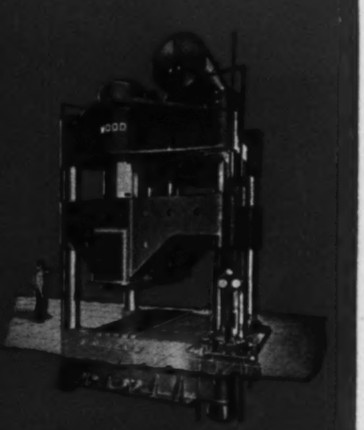




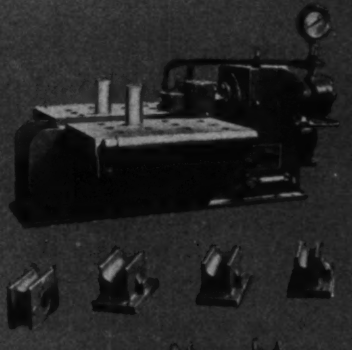
For Straightening Operations—Machine Number 8775, HydroLectric open-gap press. Capacity, vertical ram, 750 tons, horizontal ram, 400 tons; gap, 7'0"; vertical daylight, 4'6"; height of press, 26'5"; floor space, 21'10" x 20'0".



For Flanging Operations—Machine Number 8487, sectional hydraulic flanging press—also for joggling and upsetting operations. Capacity with vertical rams in unison, 300 tons; horizontal ram, 115 tons; stripper ram (in bed), 115 tons; gap, 5'0"; vertical daylight, 3'9"; height of press, 15'9"; floor space, 5'0"x14'2".



For Bending and Forming Operations—Machine Number 8548, hydraulic press. Capacity, 1,500 tons; moving platen size, 1'10" x14'2"; ram stroke, adjustable, 4'0"; height of press, 29'; floor space, 16'0"x15'6".



For Pipe Bending Operations—Machine Number 9089, horizontal cold-bending press, complete with self-contained pumping system. Capacity, 25 tons; stroke of ram, 11"; table size, 2'8½"x4'2".

For Tube Testing Operations—Machine Number 9284, hydrostatic tube testing machine. Capacity, 4½" to 12" OD tubes, maximum tube length, 35'; test pressure, 700 to 1,500 psi; average production (12" tubes, 35' long), 30 per hour; floor space required, 5'0"x45'0".

Complete Line of Hydraulic Valves—Every hydraulic valve you need for a new system or updating an existing installation. Choose from a complete line of stop valves, check valves, operating valves, safety relief valves, shock absorbers, accumulator control valves and a large variety of special valves.

URICK'S
URITE GRAY IRON

32"
Wt. 190 lbs.
GEARED TO THE JOB

URICK Foundry's integrated sales and engineering departments are geared directly to the production department—all working together to supply high quality gray iron castings with dimensional stability, uniform density, and high machinability.

From the planning stage, all the way to the finished part, URITE gray iron castings are designed and engineered to deliver greater tensile strength in relation to the service required, and in many cases with less weight. URITE gray iron is better because it is cast with fine flake graphite uniformly distributed throughout the iron matrix.

URICK'S modern facilities, manned by a competent co-operative team, produces quantities of high grade castings to meet the most demanding schedules.

Contact URICK, the foundry that starts with "U" and stays with you. Write for advanced technical data about URITE gray iron castings.

URITE CASTINGS
URICK FOUNDRY
DEPT. S-2 ERIE, PENNSYLVANIA

(*Concluded from Page* 125)

steel; and steel fabricating machinery and equipment.

Seeks Ore in Reservation

Colorado Fuel & Iron Corp., Denver, has obtained exclusive ore prospecting rights on Apache Indian land in Arizona. A two year permit covers 188 square miles in the Ft. Apache Indian Reservation. Surveys indicate the area contains about 10 million tons in iron ore reserves. The firm also will search for asbestos, manganese, and coal.

Plating Equipment Offered

Selectrons Ltd., New York, has been organized to build plating equipment. The company is introducing a line of equipment designed for controlled deposits of many metals and alloys on a wide range of conductive basis materials.

Firms Change Identities

Five metalworking firms have announced changes in their corporate names.

Columbus McKinnon Chain Corp., Tonawanda, N. Y., has dropped the word "Chain" from its name. The new name, Columbus McKinnon Corp., is more representative of the varied products of the firm's several divisions: Chain, Chisholm-Moore Hoist, Conveyor, and Mining Equipment.

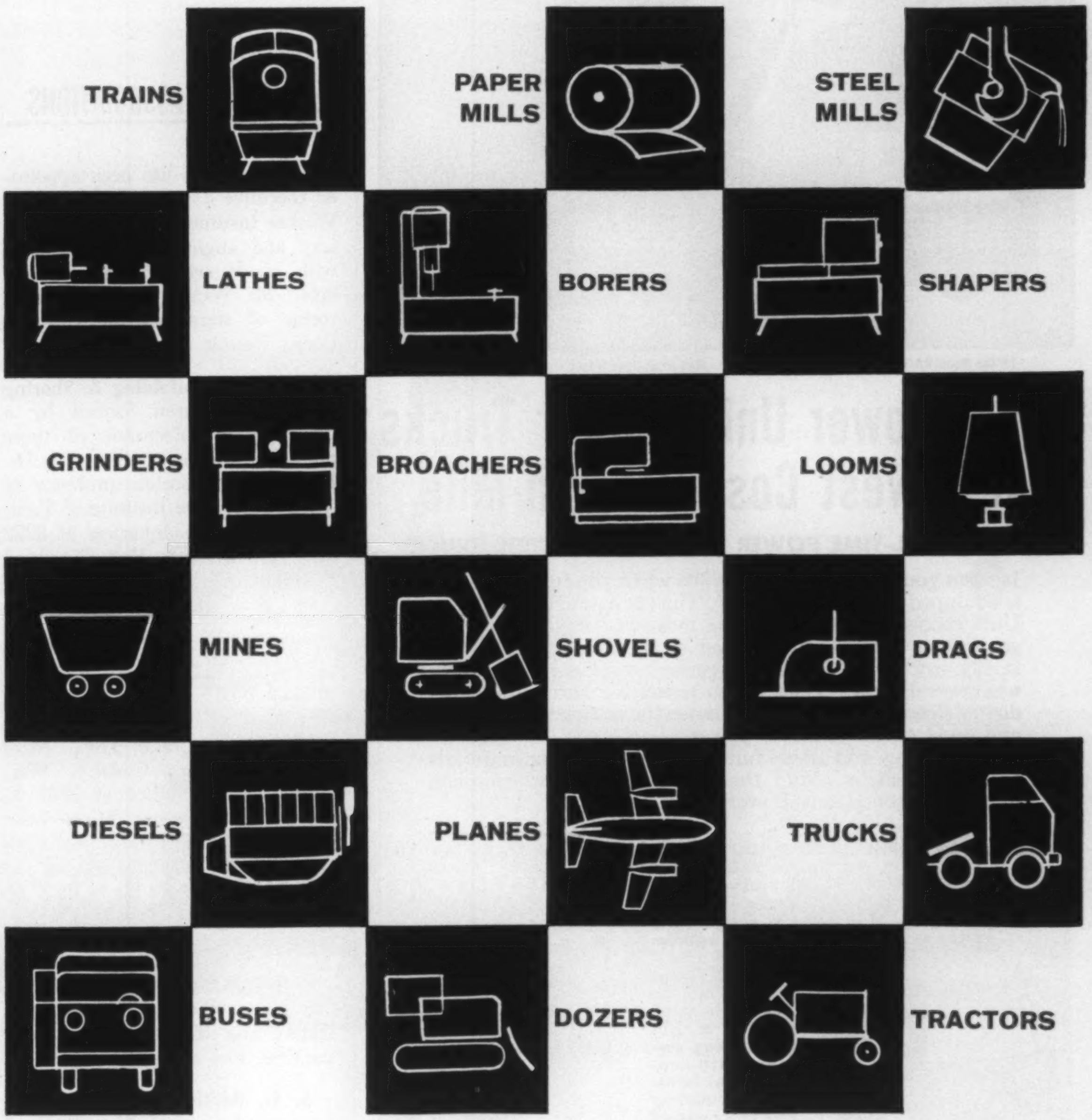
Aluminum Foils Inc., Jackson, Tenn., changed its name to Consolidated Aluminum Corp. The firm produces aluminum foil, coiled sheet, and superpurity aluminum.

Temco Aircraft Corp., Dallas, changed its name to Temco Electronics & Missiles Co.

Stolper Steel Products Corp., Menomonee Falls, Wis., changed its name to Stolper Industries Inc. The company fabricates parts from aluminum and other nonferrous materials as well as steel, including stainless. Other activities include production of parts reinforced with glass fiber, and design and engineering of operator cabs, air conditioning, and military winterization.

Avco Corp., Cincinnati, is changing the name of its Crosley Div. to the Avco Electronics & Ordnance Div. Long associated with consumer items, the new name defines the

If you manage or operate any of these...


TRAINS
PAPER MILLS
STEEL MILLS
LATHES
BORERS
SHAPERS
GRINDERS
BROACHERS
LOOMS
MINES
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DRAGS
DIESELS
PLANES
TRUCKS
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DOZERS
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. . . your best move is to Sinclair's specialized greases, oils and lubricants, to cut costs, speed operations and increase profits. There are more than 500 of these money-savers, and each does its particular job particularly well. For helpful information based on actual experience, call your Sinclair Representative or write

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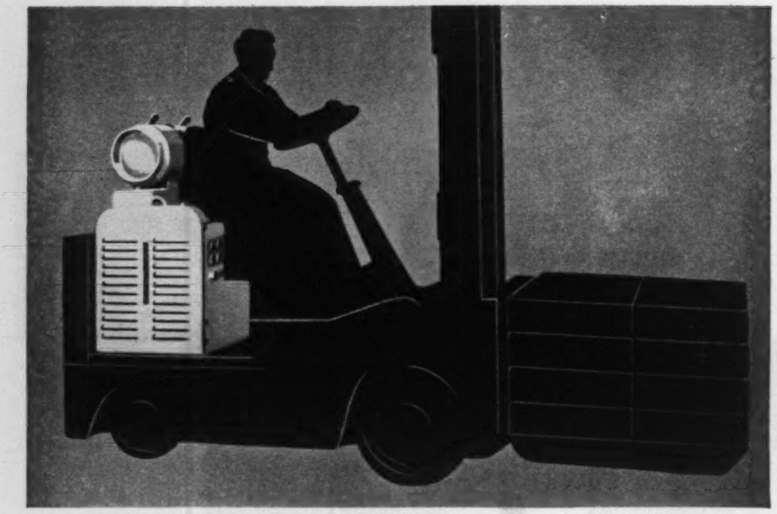


LP-Gas Model HA-3 with recessed housing can be installed on sit-down trucks without seat alteration.

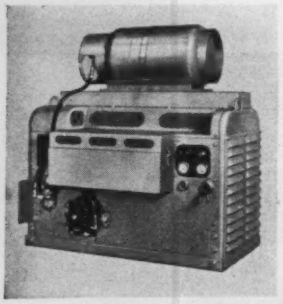
Ready-Power Units Power Trucks At Lowest Cost Per Ton-Mile

ASSURE FULL-TIME POWER FOR YOUR ELECTRIC TRUCK

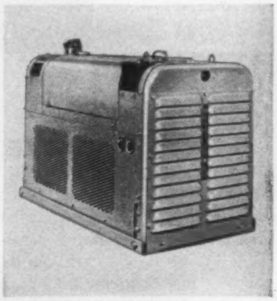
It costs you less to move materials when your electric truck is equipped with Ready-Power. The compact Ready-Power Unit consists of a dependable industrial engine and DC generator. It is easily installed or interchanged on practically any make of truck and generates full capacity power whenever needed. There is no power lag, no truck slowdown. Ready-Power also eliminates the constant recharging and replacement of stored power.

Save money and assure full-time power for your materials handling vehicles. Mail the coupon below for complete information on Ready-Power Units.

SERIES HA FOR FORKS UP TO 8,000 LBS., PLATFORMS UP TO 10,000 LBS.



Ready-Power Series HA Units are designed for use with medium size fork, platform and crane trucks. They are available with gasoline or LP-Gas fueling systems, with conventional housing for stand-up trucks or recessed housing for sit-down trucks.



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division's new role. Today it is engaged almost entirely in the design, development, and production of electronics and ordnance items for the armed services.

ASSOCIATIONS

C. M. Wright has been appointed executive director of the **Helical Washer Institute.** He is also secretary and engineering co-ordinator with headquarters in the Detroit area. Mr. Wright formerly was director of standards for Chrysler Corp., Detroit.

The **Steel Scaffolding & Shoring Institute** has been formed by a group of manufacturers of those products. Managing director is Dr. J. B. Scalzi, associate professor of engineering, Case Institute of Technology, with headquarters at 2222 Mt. Vernon Blvd., East Cleveland 12, Ohio.

NEW OFFICES

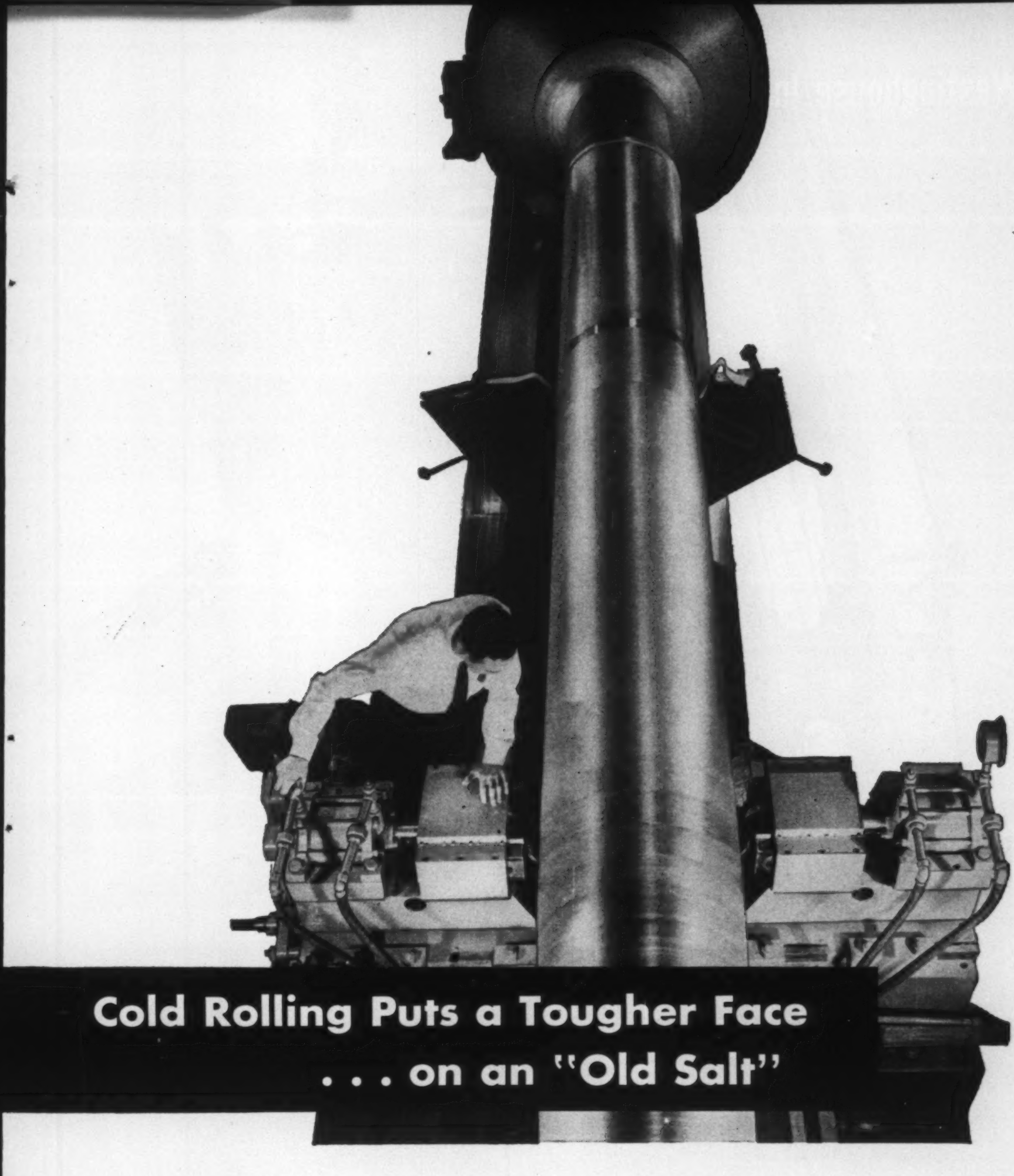
Milwaukee Crane Div., Novo Industrial Corp., Cudahy, Wis., opened a sales office at 2826 E. Grand Blvd., Detroit, Mich. John DePotter has been appointed manager and will be responsible for the sale of the division's heavy duty industrial cranes and welded bridge structures.

Carpenter Steel Co., Reading, Pa., opened an office at 3511 Hall St., Dallas. The firm produces specialty stainless, tool, and alloy steels.

A. O. Smith Corp., Milwaukee, has opened a new Welding Products Div. office in Washington. Jack H. Rees will head the office, which will serve welding customers in the District of Columbia, Maryland, Virginia, and North Carolina.

Cochrane Corp., Philadelphia, has opened a branch office at 4010 W. 65th St., Minneapolis 24, Minn. Curtis T. Thompson is manager.

McJunkin Corp., Charleston, W. Va., opened a branch warehouse and office in Cincinnati. The



Cold Rolling Puts a Tougher Face . . . on an "Old Salt"

To increase fatigue resistance, endurance limit and to fight the corrosive action of the sea, Erie Forge & Steel technicians cold roll ship's tail shafts as illustrated above. The life of the forged steel tail shaft is prolonged by cold rolling under the propeller and the after bearing. The surface toughness thus effected reduces fretting corrosion, minimizes pitting, costly failures and the hazard of propeller loss at sea.

Cold rolling is applied not only to new shafting but also for reconditioning existing ship's shafts, thus saving sizeable replacement costs in many instances.

Designed and built by Erie Forge & Steel engineers, the machine cold rolls shafts of any length and up to 30 inches in diameter. Any desired pressure up to 37,000 pounds can be exerted by the hardened steel rollers on each side of the shaft.

The Society of Naval Architects and Marine Engineers recommends that all ship's propeller shafts be cold rolled as a safety measure. This cold rolling process is approved by The Bureau of Ships, United States Navy.

Another of the special services characteristic of the continuing progress in steel improvement at Erie Forge & Steel. Let us work with you on your steel forging and casting requirements.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

Westinghouse Induction Heating . . .

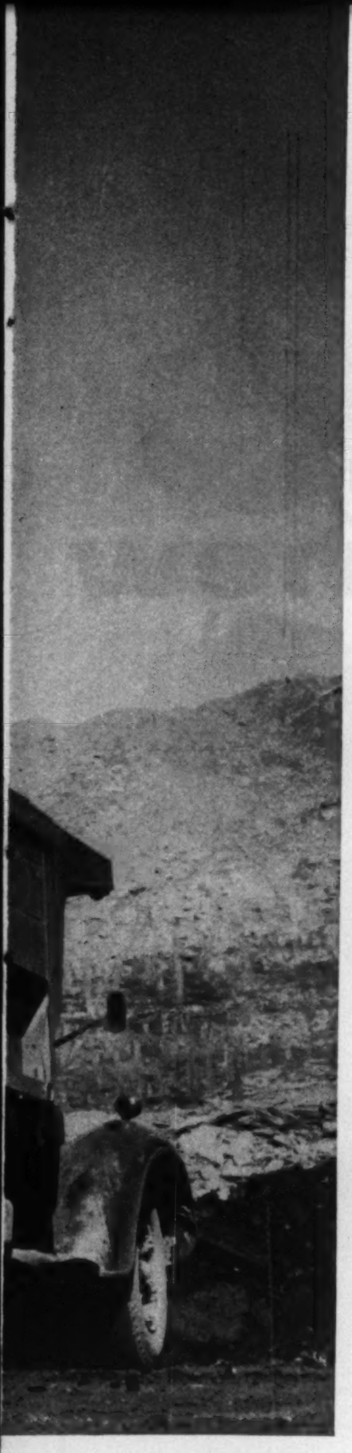
An axle has to be extra tough to take this kind of punishment. Low distortion induction heat treating makes it possible.

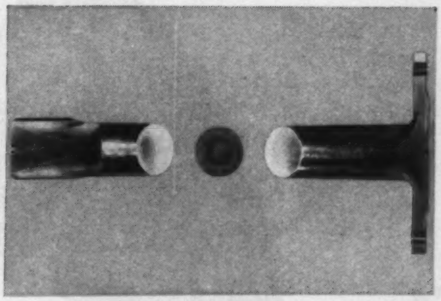
Why International Trucks shoulder bigger loads

Conventional heat treating just wasn't good enough for International Harvester's Fort Wayne Works. They wanted a process that would increase axle strength with minimum distortion. That's why they installed Westinghouse low distortion Induction Heating equipment at the Ft. Wayne truck plant.

More than **150,000** IH truck axle shafts have been hardened with Westinghouse equipment, and none have required straightening!

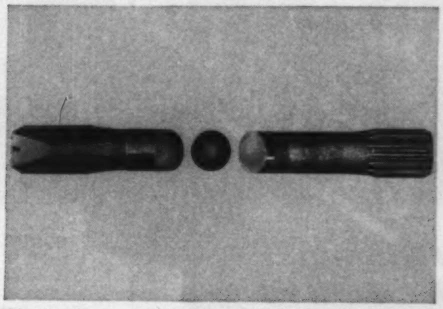
Higher cost? Not with this new Westinghouse equipment. This method of induction hardening actually cuts costs . . . two ways. First, no cold straightening is required. Second, tests prove that axles made with 1041 carbon steel induction hardened with Westinghouse low distortion equipment are 100% stronger than axles made with higher-cost 4150 alloy hardened in a furnace. Westinghouse low distortion Induction Heating can bring you lower material and handling costs, fewer





Westinghouse low distortion induction heating on a typical axle provided tensile strengths up to 290,000 psi using 1041 carbon steel. This compares with 185,000 psi using 4150 alloy and furnace heat treating.

The rugged Westinghouse Induction Scanner installs directly into the production line. No warm-up time required, no hot stock inventory. Equipment can be made to match your present and future production requirements.



Westinghouse induction heating offers more precise control of heated depth making it possible to replace a furnace treated alloy steel with a low carbon type.

without Axle Failure

replacements, and more satisfied customers. For details, call or write your Westinghouse representative, or Westinghouse Electric Corporation, Industrial Electronics Department, Baltimore 3, Maryland. You can be sure . . . if it's Westinghouse.

Westinghouse

J-35016

firm distributes tubular steel products and industrial supplies. Clyde Loescher is branch manager.

Melpar Inc., Falls Church, Va., a subsidiary of Westinghouse Air Brake Co., opened a branch office at 468 Bedford St., Beverly Hills, Calif. S. M. Benford is manager of the new office.

CONSOLIDATIONS

Federal Lime & Stone Co., Cleveland, purchased **South Euclid Concrete Co.,** also of Cleveland. Federal Lime & Stone is a shipper of fluxing stone to the steel industry and of crushed stone to the construction industry.

Youngstown Steel Door Co., Youngstown, will buy the assets of Pipe Coupling Manufacturers Inc., Martins Ferry, Ohio, subject to approval of Pipe Coupling stockholders.

Barry Controls Inc., Watertown, Mass., and **Wright Line Inc.,** Worcester, Mass., have merged. Officers of the new firm, Barry Wright Corp., include: Chairman, R. Perry Collins; president and chief executive officer, Ervin Pietz. Headquarters are in Watertown. Divisional operations include: Wright Line Div., Worcester; Barry Controls Eastern, Watertown; Barry Controls Western, Glendale, Calif.; and Insco Div., Groton, Mass. Subsidiaries are: Wright Line of Canada Ltd., Don Mills, Ont.; Barrymount Corp., Chicago; and Vlier Engineering Corp., Los Angeles, with Wespo Div. in Detroit.

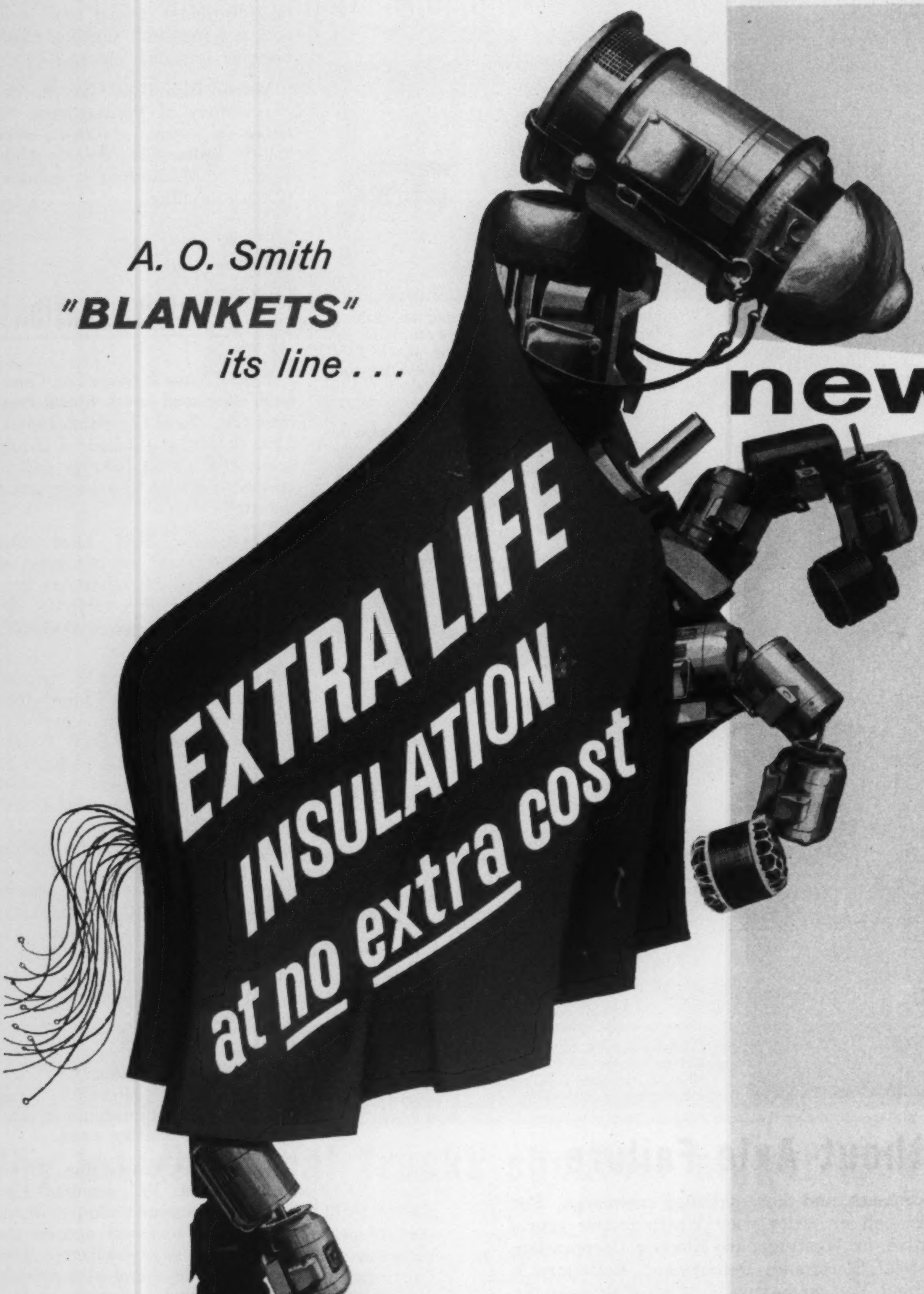
Amercian Brake Shoe Co., New York, acquired **Herscott Corp.,** Rockford, Ill., manufacturer of electric resistance heating units.

G. & W. H. Corson Inc., Plymouth Meeting, Pa., acquired **Livingston Electronic Corp.,** Essex Fells, N. J., and will operate the property as a subsidiary. Livingston has developed high altitude packaging and hermetic sealing techniques and produces full wave, synchronous, welding timers; time delay relays; and associated equip-

(*Please turn to Page* 136)

A. O. Smith
"BLANKETS"
its line . . .

new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INSULATION
at no extra cost

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HARD-RUNNING HORSES STAY HEALTHY WITH THERMOSEAL INSULATION ON ALL A. O. SMITH INTEGRALS & FRACTIONALS

Protective coloring! The blankets on the horses of A. O. Smith are a "cool" green — cool because new Thermoseal insulation system can accommodate a significantly greater temperature rise . . . more horsepower in a smaller frame. This means extended life and dependable operation under the most adverse operating conditions.

All the horses of A. O. Smith have this blanket protection at no extra cost. For the complete story on Thermoseal, mail the coupon.

protection with THERMOSEAL® insulation

INSULATING VARNISH on all A. O. Smith motors exceeds requirements for Class F, B and A ratings. This clear, thermosetting polyester also has high dielectric strength — maintains it under Class F as well as less severe conditions. High resistance to moisture, chemicals and oils — surpasses MIL-V-1137A requirements for resistance to fresh water immersion and resistance to salt water and acid.

SLOT AND PHASE INSULATION is of mylar type. Insensitive to moisture with high resistance to solvent and chemical attack. Dielectric strength is greater than almost any known flexible insulating material . . . tensile strength is greatest of any plastic fiber. Operating temperature range of –60° C to 150° C. All these qualities in a single film that won't dry out or become brittle with age.

MAGNET WIRE INSULATION — Choice of two at no extra cost! Polyvinyl for maximum moisture protection (standard unless specified otherwise). Or new Polyester for greatest thermal resistance (meets Class F specifications). Polyester type is outstanding in initial dielectric strength and retention of this property at operating temperatures and after exposure to humidity.

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Milwaukee 1, Wisconsin, U. S. A.

Please send me comprehensive details on A. O. Smith Thermoseal insulation.

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City...Zone.........State..................

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An additional
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NOW available from Bunting distributors all over America

Bunting nylon puts at the disposal of engineer and manufacturer a tested material for bearings and parts that fully meets all requirements in which the unique qualities of nylon are desired. It is strong, tough, heat resistant, rigid but with high embeddability, and practically self-lubricating. There are many and various applications where Bunting nylon will improve performance.

- Bunting nylon is available from stock in solid rods, extruded tubes, tubular bars, pressure tubing and plate.
- Unusually wide range of sizes and shapes provides low cost fabrication and minimum of machining.
- It is readily machined, blanked, ground, turned and welded or bonded with adhesive. High production speeds can be maintained.

Bunting nylon expands Bunting's comprehensive service—now supplying bearings, parts and bars made of cast bronze, sintered metals, aluminum and nylon. Available from stock or made to blueprint for production and maintenance requirements.

EASY TO TRY IT

Small lots of special design Nylon bearings, or parts, can be made immediately by fully equipped emergency machine shops in Bunting branches. The wide range of sizes and shapes of Bunting Stock Nylon makes the alteration of a stock item easy and economical. Your local Bunting Distributor can arrange for such work.

Write for this Nylon Catalog and Listing No. 32

the BUNTING Brass and Bronze Co.
TOLEDO 1, OHIO

BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS OF CAST BRONZE, SINTERED METALS AND ALUMINUM } WRITE FOR CATALOG No. 58

(Concluded from Page 133)

ment. The company has participated in miniaturization programs with major military suppliers.

Westinghouse Air Brake Co., Pittsburgh, purchased **Petch Mfg. Co.** and **Petch Industries Inc.**, Alpena, Mich. The property will be operated by the Industrial Products Div., managed by A. J. Bent. C. L. Petch will continue to be in charge of the Alpena operations. The Petch organization makes machine tool quality, pneumatic and hydraulic cylinders.

White Motor Co., Cleveland, is negotiating to acquire the $80 million farm equipment business of **Oliver Corp.**, Chicago.

Hewitt-Robins Inc., Stamford, Conn., will purchase **Union Chain & Mfg. Co.**, Sandusky, Ohio, subject to approval of Union Chain stockholders. The Sandusky firm makes conveyor and power transmission chain and sprockets. Products made by Hewitt-Robins include material handling and processing equipment, conveyor belting, industrial hose, and power transmission machinery.

NEW PLANTS

Superior Steel Products Corp., Milwaukee, opened a 10,000 sq ft manufacturing facility in Cheshire, Conn. The plant is a replacement of an older facility and turns out steel die sets. John Cluney is general manager of the Eastern Div. plant.

Portable Electric Tools Inc. moved its manufacturing operations to its new plant at 1200 E. State St., Geneva, Ill. Executive offices will be moved to Geneva about Oct. 1.

Zenith Radio Corp., Chicago, will build a plant in Paris, Ill., to produce radio parts and other electronic components. The plant will be built for Zenith's subsidiary, Central Electronics Inc., and is part of the parent firm's $7.5 million expansion program. The first unit of the plant will have about 100,000 sq ft of floor space.

Coupling a billion horsepower

Fast's Couplings are the choice of more industrial equipment manufacturers than any other gear-type coupling. Added fact: The Fast's line is more complete, with more applications. So it takes no more than a conservative estimate of total horsepower ratings to pass the billion mark.

Reasons for this popularity? Every Fast's Coupling brings you superb engineering only the original gear-type coupling can deliver. Smooth-running units that are designed to outlast the machines they connect. Rapid service from experienced field engineers backed by outstanding stock facilities.

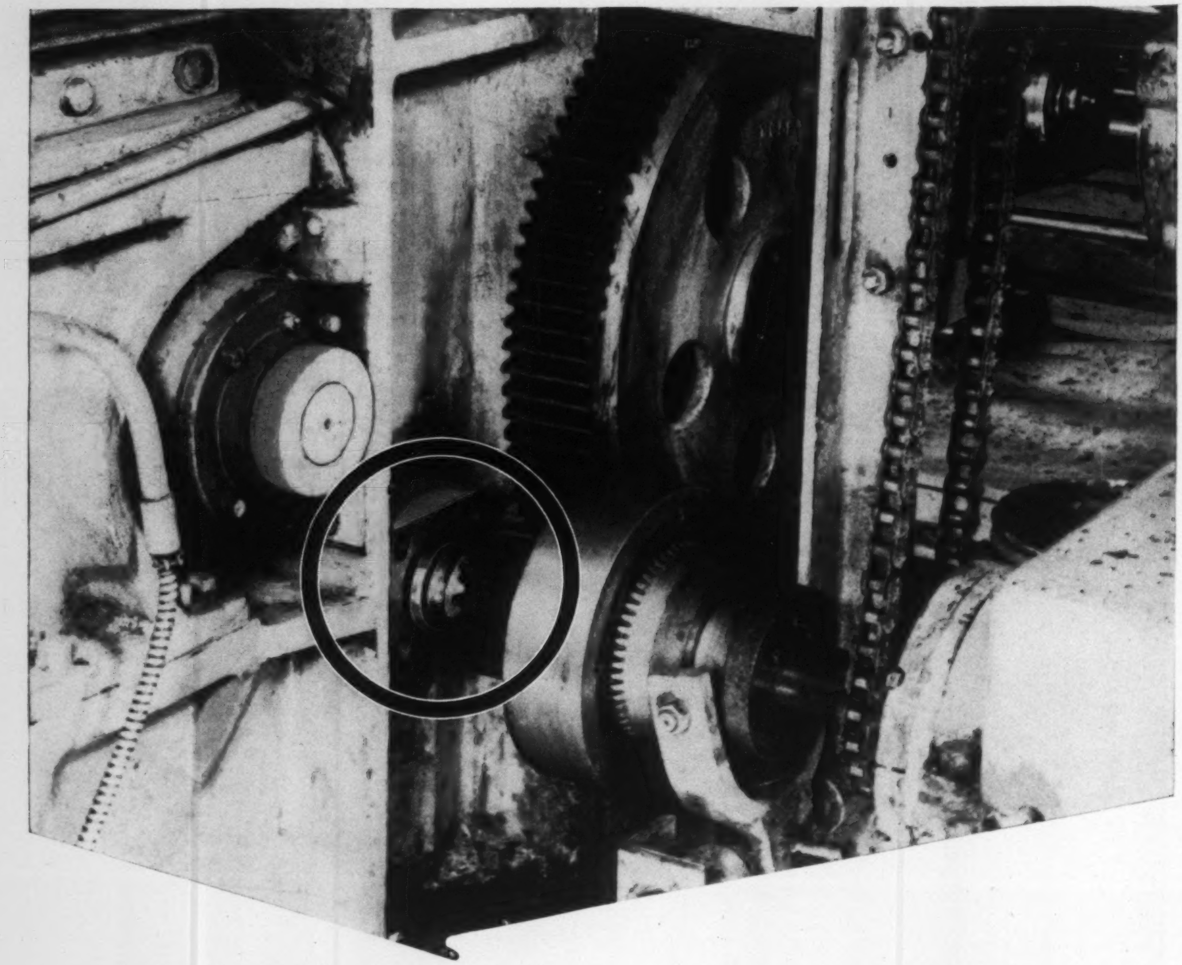
Second billion, here we come...

KOPPERS

FAST'S COUPLINGS

Engineered Products Sold with Service

Metal Products Division, 200 Scott St., Baltimore 3, Md.



Bearings, Inc. engineers will upgrade your equipment - eliminate early bearing failures!

The original bearings on the pinion drive of this corrugating machine had an average life of only three months. Our customer had been advised that only a complete engineering change of machine drive would solve the problem.

Our engineers refused to accept this verdict and after much research found a standard, double row, roller bearing that, plus a standard adaptor, would fill all dimension requirements and give the radial capacity necessary for trouble-free operation.

We solved this bearing problem (as we have solved countless others) because we are authorized distributors for all nationally-known makes of bearings. We know the characteristics of each type of bearing and our recommendations are backed by many years of experience.

When you need bearings for any purpose, call the branch nearest you. We have the most extensive, the most complete stock of bearings and bearing accessories in the world ready to serve you.

Providing bearing service in the North →

BEARINGS, INC.

DELAWARE: Wilmington • **ILLINOIS:** Neiman Bearings Co., E. St. Louis • **INDIANA:** Ft. Wayne • Indianapolis • Muncie • Terre Haute • **MARYLAND:** Baltimore • **MISSOURI:** Neiman Bearings Co., St. Louis • **NEW JERSEY:** Camden • Newark • **NEW YORK:** Balanrol Corp., Buffalo • Niagara Falls • **OHIO:** Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Painesville • Toledo • Youngstown • Zanesville • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York • **WEST VIRGINIA:** Charleston • Huntington • Parkersburg • Wheeling

and

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We Must 'Engineer' for Competition

For much of two decades, demand for steel has outstripped capacity. Producers have been content to share in a sellers' market. They have not been too concerned about competition.

Now the industry is feeling a three-way pinch. Capacity operations are not in sight.

- Domestic sales are falling short of expectations.
- Competitors have moved into the market. Foreign steel producers, aided by expanded capacity and tremendous wage rate advantages, lay down steel at U. S. plants at prices we can't meet. They're well below the costs of U. S. mills.
- Other materials—including aluminum, plastics, and concrete—have made substantial gains. In some cases, they have supplanted steel. In others, they have filled new structural applications which might have been won by steel.

Percentagewise, the gains of competitive materials are impressive. They're not unimpressive tonnagewise.

The steel industry has cause for concern. There is a need to regain markets lost to foreign steel and to other materials. There is an opportunity to develop steels to meet the new needs of the much larger market that's on the horizon.

A few pages to the right of here, thoughtful steel leaders outline what must be done in technology to improve efficiency, lower costs, and produce steels tailored to the customers' needs.

They emphasize improved treatment of raw materials. They evaluate the new processes of steelmaking and the application of automated controls to these processes. They stress the need for more formalized research and the development of special quality steels, with properties far exceeding those we have today.

We believe one more thing is needed—better marketing. Steel producers must recognize they are fighting for a share of the total materials market. They must abandon the idea they are sharing just a market for steel.

They must aid customers with design problems. They must further promote steel as a versatile material. They must orient themselves to growth and to change.

Producers of competitive materials have already done so.

Important progress is already being made by many steel producers in adopting a new attitude toward technological advances and more aggressive marketing. Even though steel has many inherent advantages, they recognize that we must do a lot of "engineering" to meet the challenge of competition.

The iron and steel engineers meeting in Cleveland next week have a man-sized share of that responsibility. We dedicate this special section to them.

Walter J. Campbell

EDITOR

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U.S. Share of World Steel Falls

ALTHOUGH THE U. S. is still the world's largest steel producer, our lead isn't as commanding as it was only a few years ago. In 1955, this country accounted for 39 per cent of the world's steel output. Last year, our share dropped to 28 per cent.

Foreign steelmakers have been expanding their facilities at a brisk pace, and they show no inclination to slow down.

Take the European Coal & Steel Community. Its steel production jumped 20 per cent between 1955 and 1959. During the same period, U. S. production fell 10 per cent. During those years, ECSC countries spent $2.4 billion for capital investments in the iron and steel industry. As of Jan. 1 of last year, another $912 million was scheduled to be invested. By 1965, scheduled expansion will boost productive potential 41 per cent over 1959 output.

- **Reasons for Growth** — The climate abroad is right for industrial growth. Rising standards of living have given impetus to markets for many consumer products similar to those found in U. S. homes—creating new demands for steel and steel products. And you find the will to expand (see STEEL, Sept. 5, p. 48) at the management, labor, and government levels.

Foreign firms are also favored by modern equipment and technical knowhow, which help to hold down production costs on quality products. Another thing: New processes are given every chance to pay off commercially.

- **The Next 15 Years** — Although Western Europe as a whole is a net exporter of steel, a number of countries are likely to remain net importers over the next 15 years—even though most of them have their own steel industries and relatively well developed economies. Of the present net importers, Spain is expected to become self-sufficient, and Sweden will probably develop into a net exporter. The Swedish steel industry is one of the world's oldest, but its marked specialization in alloy steels has forced the country to import much of the simpler forms of steel. Authorities assume that all other Western Europe countries will continue to import a considerable share of their needs.

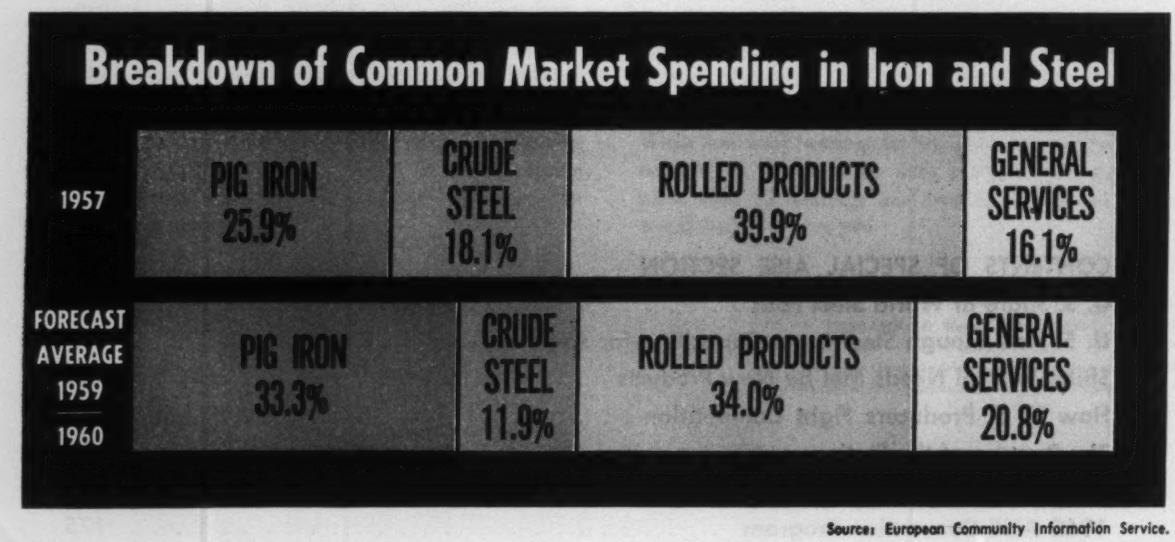
Despite impressive production growth planned for Latin America, the region will remain a net importer. Argentina, Mexico, and Venezuela will make great strides. Brazil and Chile may do some exporting—but mainly to other Latin countries.

The major part of African steelmaking will be centered in the Union of South Africa, the only country on that continent with an established industry. But others are developing facilities.

Egypt is the Middle East's leading steelmaker. Australia, in Oceania, will become an exporter of steel. India is developing a strong steel industry, but she will continue to require extensive imports.

Japan will be the only country in the Far East with surplus steel output. The country became a steel exporter before World War II, but the size of her surplus should decline because of great expansion in domestic, steel consuming industries.

- **What Russia's Doing** — Ferrous metal production in Russia is being rapidly expanded as part of the latest seven year plan. The Iron & Steel Industry Department of the USSR State Planning Commission reports three blast furnaces, ten open hearths, three electric steel



Source: European Community Information Service.

World Production and Planned Capacity Of Crude Steel and Castings

(MILLIONS OF NET TONS)

	Projected Capacity 1965	Production 1959†	1955
EUROPE	**278.2**	**189.4**	**153.2**
Western Europe	**150.3**	**102.9**	**87.8**
European Coal & Steel Community	97.7	69.5	57.9
Benelux	16.4	12.9	11.1
France	25.3	16.7	13.9
Italy	14.3	7.4	5.9
West Germany*	41.7	32.3	27.0
United Kingdom	34.1	22.6	22.2
Other Western Europe	18.5	10.8	7.8
Eastern Europe (Red bloc)	**127.9**	**86.5**	**65.4**
Czechoslovakia	10.4	6.7	4.9
Poland	9.7	6.8	4.9
USSR	97.4	65.9	49.8
Other Eastern Europe	10.5	7.2	5.8
NORTH AMERICA	**169.9**	**99.4**	**121.6**
Canada	9.9	5.9	4.5
U.S.	160.0	93.4	117.0
FAR EAST	**38.3**	**20.9**	**12.3**
India	10.0	2.5	1.9
Japan	27.5	18.3	10.3
Red bloc	**26.1**	**15.2**	**3.2**
China	25.0	14.7	3.1
LATIN AMERICA	**10.5**	**4.2**	**2.5**
OCEANIA	**5.9**	**3.8**	**2.5**
Australia	5.5	3.7	2.5
AFRICA	**4.6**	**2.0**	**1.8**
MIDDLE EAST	**1.0**	**0.2**	**0.1**
TOTAL FREE WORLD	**380.5**	**233.3**	**228.5**
TOTAL RED BLOC	**154.0**	**101.7**	**68.6**
GRAND WORLD TOTAL	**534.5**	**335.0**	**297.1**

†Estimated. *Includes Saar. Sources: American Iron & Steel Institute, U. S. Steel Export Co. Individual countries listed are those planning over 5 million tons of capacity in 1965.

smelting furnaces, two bessemer converters, seven rolling mills, five coking batteries, and mines yielding 23 million tons of iron ore annually were put into operation in 1959.

This year, the Commission says five blast furnaces, ten more open hearths, three electric furnaces, six rolling mills, a sheet steel cold rolling department, steel and iron pipe operations, and eight coking batteries will be started up.

• **Still Going Up**—World production of crude steel in the first six months of 1960 set a record for the period. The Department of Commerce expects the year's total to top 1959's record (318 million tons).

The U. S. was the only major steelmaker to register a decline during the first half. Production fell 5 per cent to 60.7 million tons. The biggest rates of increase were chalked up by Japan (40 per cent, to 11.6 million tons); Italy (30 per cent, to 4.5 million tons); United Kingdom (28 per cent, to 13.9 millions tons); and West Germany (23 per cent, to 18.4 million tons).

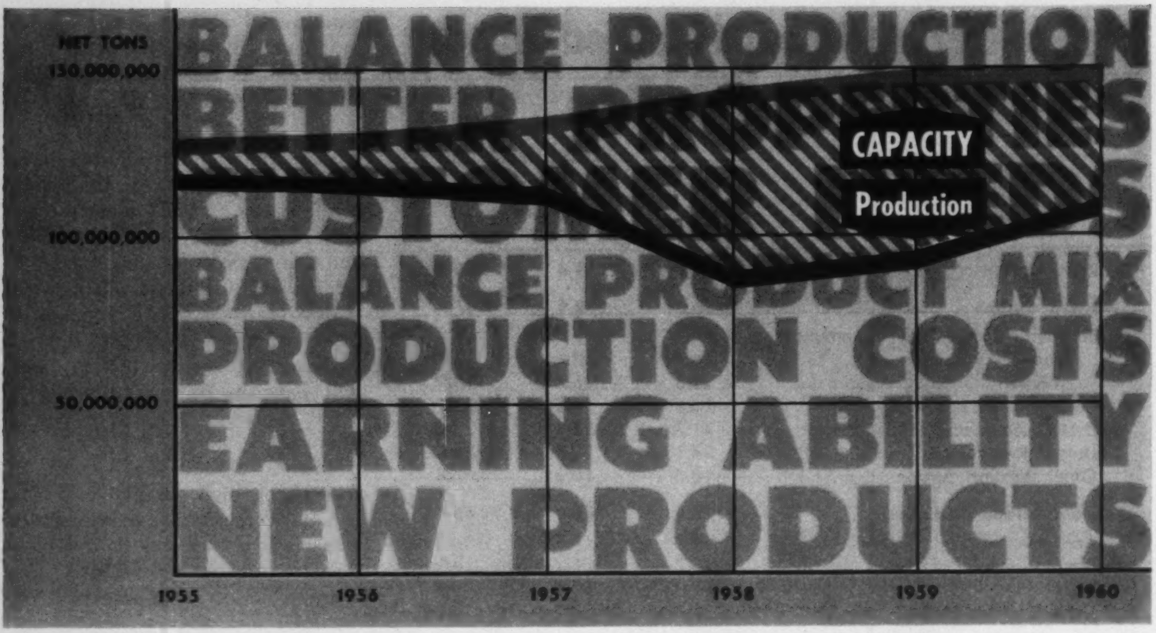
• **Raw Material Trends** — A scrap shortage is anticipated in the middle of the sixties. That's when the impact of World War II destruction and the period's limited output of civilian manufactures will be felt.

Iron ore reserves are sufficient to meet estimated demands through 1975. But ore production plans will have to be carefully laid to avoid shortages of ores of desired quality.

The U. S. and USSR, with resources of high quality coal that can be worked through mechanical extraction, will be able to cover any deficits arising elsewhere. But many overseas steelmakers will rely on their own energy sources—such as fuel oil, natural gas, water power for electricity, and domestic coal which can be used after washing and screening, or after it is blended with imported coal and coke.

• **Trends in Processes** — The relative importance of steelmaking processes varies widely from region to region. Although the bessemer converter process accounts for 48 per cent of Western European output, it is the least universal process, and on a world-wide basis, it is diminishing in importance. The open hearth method predominates in almost every region of the world, accounting for over three-fourths of global steel capacity. Electric furnaces are rapidly gaining acceptance, especially from producers in smaller countries and those who make specialty steels. Oxygen steelmaking is also growing fast and is expected to make the greatest strides in the next decade.

• **Summary**—World-wide demand for steel will keep pace with improving standards of living. The general trend is toward large, integrated operations. Deficits are likely to increase in the Far East, Latin America, and the Middle East—in that order. There may be a smaller deficit in Africa. The USSR, North America, and Europe will remain surplus regions. In any event, the "have nots" are striving to lessen their dependence on the "haves."



U. S. Has Enough Steel Ingot Capacity ---for Awhile

Now Industry Will Concentrate on Improvement of Finishing Facilities

IMPROVEMENT of finishing facilities—rather than expansion of ingot capacity—will command most of the attention of the U. S. steel industry in the next five years.

Ingot capacity was boosted 22.7 million tons (18 per cent) in the last five years, giving the industry an adequate cushion for the present. Our annual ingot capacity was 148.6 million net tons on Jan. 1, 1960, 31.6 million net tons above the production record—117 million net tons in 1955. To achieve the record, the industry had to operate its steelmaking furnaces at 93 per cent of capacity. Now, it can produce that much at only 79 per cent of capacity.

• **Timetable** — Ingot capacity will continue to grow over the next five years—but at a slackened pace. The tempo will be stepped up around 1965. Look for capacity to rise by 30 million tons over the next ten years, with most of the growth occurring between 1965 and 1970.

Steelmaking will undergo some change as to type over the next few years. The oxygen converter process will account for an increasing share of the country's steelmaking capacity.

• **Oxygen Process Grows** — Four U. S. companies (see STEEL, Aug. 29, p. 327) are already using oxygen converters; two have announced they will adopt it; and several others are giving it serious consideration. Great Lakes Steel Corp., a subsidiary of National Steel Corp., for instance, will install two oxygen converters at its Ecorse (Detroit), Mich., plant. They will supplant part of the plant's open hearth capacity. Although they will have an annual ingot capacity of 2 million net tons, total ingot capacity of the plant will be increased by 500,000 tons.

While the oxygen converter process will make substantial inroads, a hefty chunk of capacity will continue to be represented by open hearths, but they may undergo some major modifications. Nicholas P. Veeder, president, Granite City Steel Co., Granite City, Ill., says ". . . nobody in the steel industry is really sure how much the production of (present) open hearth furnaces . . . can be increased by oxygen roof lances, faster charging, and larger hearth areas.

• Big Advantage—"We have every incentive to wait and see how much more can be done with the open hearth furnace. For Granite City Steel, as for virtually every company, the open hearth has one great advantage. It is already in place," Mr. Veeder points out.

The 1960-65 period won't be one of rest for the industry though. It will be engaged in one of the biggest jobs it ever undertook—a multibillion dollar program of improving finishing facilities.

• Billion Dollar Years—Listen to Logan T. Johnston, president, Armco Steel Corp., Middletown, Ohio: "To be ready for whatever the future brings, our industry plans to keep its capital spending at a healthy level. Perhaps a billion dollars a year is a fair, round figure.

"In the next few years, however, little of this spending will go to build additional steelmaking capacity. Instead, the accent will be on flexibility and efficiency."

• Industry's Aims—While emphasis will be on improvement of finishing facilities, the industry will be seeking flexibility and efficiency in both steelmaking and finishing. The aim will be to:

- Make a better product.
- Satisfy customer needs.
- Make new products.
- Bring product mix into balance with market area requirements.
- Put production facilities into balance with one another.
- Reduce production costs.
- Strengthen earning ability.

The U. S. steel industry must do those things to compete successfully with one another, against other materials, and foreign steel producers.

• Selling Performance—In effect, the industry will be striving to keep up with the fast moving times. As Armco's President Johnston says: "The pattern of steel use is changing. As each year passes there is less accent on sheer tons. Fewer tons are doing more things and doing them better. We are not selling tons any more, but performance. We are tending to replace 100 tons of carbon steel with 90 tons of high tensile steel.

"It is my personal feeling that the steel industry will introduce at least twice as many new products in the next ten years as in any decade in its history. Right now our research and development people have samples of new steels—steels that we know we can produce commercially—which are ahead of the design demands of the time. We are doing more than meeting the needs of our customers; we are anticipating them in many fields.

"Along with its products, steel's markets are changing.

"Look at the great swing from heavy to light steels. Today, over half our production is in light steels to make automobiles, home and office equipment, cans and containers, toys and sports equipment, and countless other items which are now deeply woven into our American standard of living," Mr. Johnston explains.

• More Ways Than One—Flexibility will be sought in numerous ways. Lukens Steel Co., Coatesville, Pa., for example, installed a 100 ton, top charge, electric steelmaking furnace a couple of years ago. Until then, it used open hearths to melt steel. After two years' experience with the electric, Lukens finds: 1. It can gear steel production to demand by operating the furnace only when it is necessary. 2. It can use the furnace for carbon or alloy steel production. 3. It has a broad choice as to the proportions of pig iron and scrap (as well as the kinds of scrap) it uses.

To get versatility of finishing equipment, for example, Republic Steel Corp. is installing a 56 in., hot strip mill at its Warren, Ohio, plant. The mill will roll all standard grades of carbon steel necessary to produce flat rolled products up to finished widths of 48 in. In addition, the mill will handle practically all the company's hot rolling of stainless steel. The exception: Extremely wide sheets, which will continue to come from the company's 98 in. mill at Cleveland. The new mill will also be used to roll silicon steel sheets, low alloy steels, and titanium. And it will be capable of turning out unusually large coils.

Demand for large coils is increasing because they allow users to reduce downtime for coil changes and for cutting out welds.

• Tomorrow's Mill Today — The design of the mill, the company says, is based not only on what Republic's customers want today but what they indicate they will want in the future.

Another of Republic's moves is to gain flexibility. It is installing a 134 in. plate mill at Gadsden, Ala. The equipment will be used as the breakdown mill for preliminary rolling operations on the plant's strip mill. It will also produce skelp for line pipe up to 36 in. in diameter, and turn out a limited amount of plates for the trade.

To update its facilities, the U. S. steel industry will spend around $1.6 billion in 1960.

• Lining Up Funds—Steel companies are arranging financing for their long range programs. For instance, Republic Steel Corp. will spend $375 million from 1960 through 1964 for modernization and improvement. It is issuing sinking fund debentures to raise $125 million, which will be added to funds available under a recently arranged bank credit agreement.

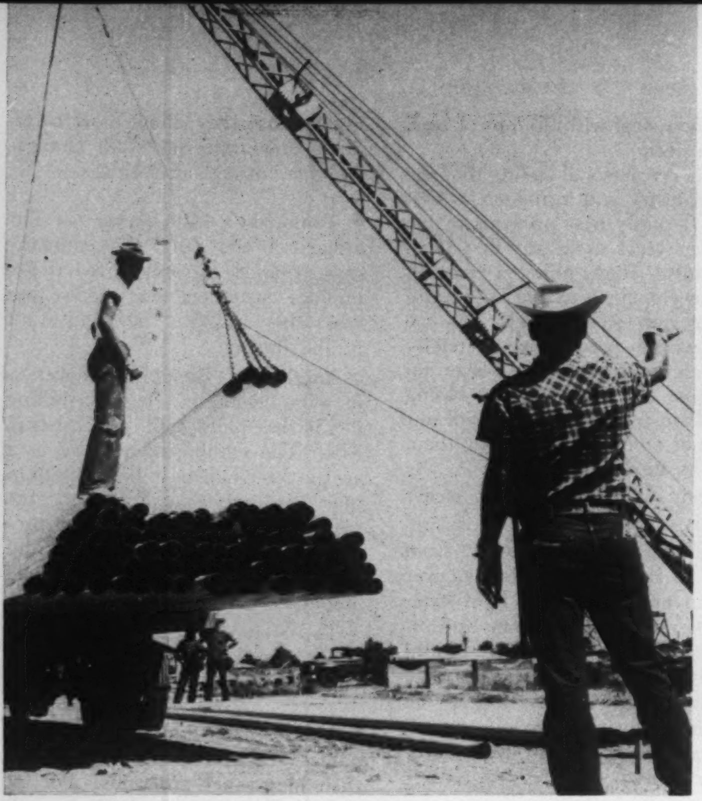
Granite City Steel has approved an arrangement for a $30 million, two year, revolving credit with seven banks, convertible at the company's option to a four year term loan. The new loan was necessitated by the enlargement of the company's expansion program.

Great Lakes Steel Corp.'s two new oxygen converters will be in addition to the parent company's (National Steel Corp.) $300 million expansion program, which National's President Thomas E. Millsop said is aimed at: 1. Cutting costs throughout National Steel operations. 2. Boosting quality control. 3. Increasing flexibility of product specifications in both quantity and quality to meet customer demands.

• Summary—The job ahead is big and costly.

The steel industry is fortunate in that it has sufficient melting capacity for a few years.

Attention and money can be concentrated where they are needed most—on finishing facilities.



Plant expansion for Republic Steel Corp. at Youngstown, boosts capacity for plastic coated pipe, introduced two years ago. Here it's being used for gas distribution lines in Buckeye, Ariz.

Shifts in Steel Needs Met by New Products

Fighting back against competitive materials, producers broaden lines, seek additional sales

TODAY, National Tube Div., U. S. Steel Corp., Pittsburgh, unveiled a new product: Buttress thread, oil country tubing.

One of many new products steelmakers have developed in response to customers' changing requirements, it's an example of a growing industry trend to meet competitive conditions. In the drive to bring out new products, old products aren't forgotten; they're being upgraded, tried for new uses. Industry's aim is twofold: 1. It wants to boost sales in tons and dollars. 2. It needs to prop up sagging profit margins.

• **Meets a Need**—Buttress thread tubing was developed to answer a specific need. Changes in drilling practices and the use of smaller diameter casings in oil wells was cutting the clearance between the inner tubing and the outer casing. Joints posed the most serious problem. Pipe ends had been upset (thickened) for added joint strength, required larger diameter couplings. Buttress thread tubing, says National Tube, gives joint strength comparable with that of the tubing body without upsetting, permits use of smaller diameter couplings, which in turn permit greater clearance.

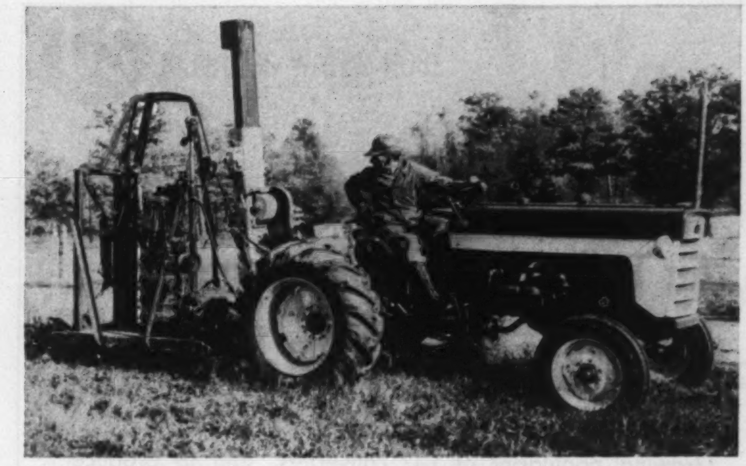
But this is just one example. Within the next few weeks, you can expect to hear of more. And growing expenditures for research and development are an indication that the parade will continue. Typical is the forthcoming production of a steel with good resistance to brittle fracture at low temperatures; it will be used in manufacture, transportation, and storage of liquefied gases.

At the other end of the temperature scale, development of alloys for high temperatures is continuing. Commercial production is in sight for heat resistant, missile steels like Rocoloy 270—a low alloy steel with yield strength of 270.000 psi recently developed by Mellon Institute, Pittsburgh (STEEL, Aug. 15, p. 51). Other alloys to watch for include a modified stainless 440C for high temperature (900° F) bearings, a stainless Type 446 with rare earths added to produce oxidation resistance at 2600° F, formulas containing beryllium (processed by vacuum techniques) for high temperature abrasion resistance of tool steels, carbon steels, hot work die steels, and structurals. And other stainless alloys with improved high temperature rupture strengths will aid in such jobs as powerplant piping.

• **Many Goals**—To meet the challenge of competitive materials, steelmakers will try to make their products stronger (permitting use of lighter gages to cut weight), more colorful, and less vulnerable to all types of corrosion. One way is by coating. Organic, ceramic, metallic, and conversion coatings are under intensive investigation; announcement of at least one type of improved coating is imminent. It's the type of research that produced vinyl coated sheets and strip, colored stainless.

Inland Steel Products Co., Milwaukee, has found a way to widen the market for steel roof decks: A process of phosphate coating steel, then flowing on an epoxy resin coating which is baked for curing.

Large steel containers are coated inside and out—inside to stand up



Helping the user put up fencing more easily is one way to expand that market. This machine, developed by U. S. Steel Corp., can erect woven or barbed wire fencing (up to five strands) or a combination

to their contents, outside for protection and appearance. They can even be lithographed in colors.

In the automotive industry, steelmakers will battle aluminum's new "mirror" finish with sparkling stainless produced by bright annealing. And they'll fight aluminum's extruded bumpers with chrome plated or stainless clad carbon steel—using new bonding methods to cut costs. To widen the use of galvanized sheets to stand up to salt corrosion, they'll offer differentially coated or one-side-only coated material for ease of welding. Longer lasting mufflers are in sight through the use of ceramic coated steel, aluminum coated steel, or a new low cost stainless product that sacrifices appearance (but not corrosion resistance) in the name of economy. It will be needed because of tougher muffler requirements. (A Los Angeles air pollution control ordinance requires motorists to have "approved" mufflers on their cars.)

In the container industry, steelmakers will try to halt aluminum's inroads (cans for motor oil, frozen fruit concentrates, beer) by producing lighter and thinner tin plate. Under development for several years, the new product weighs 45 to 60 lb per base box (vs. 75 to 100 for standard tin plate). Potential freight savings are important to volume can users.

New constructional alloys will enter the lists in the building, machinery, and transportation industries. High strength materials, until now available only in plates, will be offered in thinner gages and greater widths. So fabricators will have new opportunities for product redesign and weight reduction.

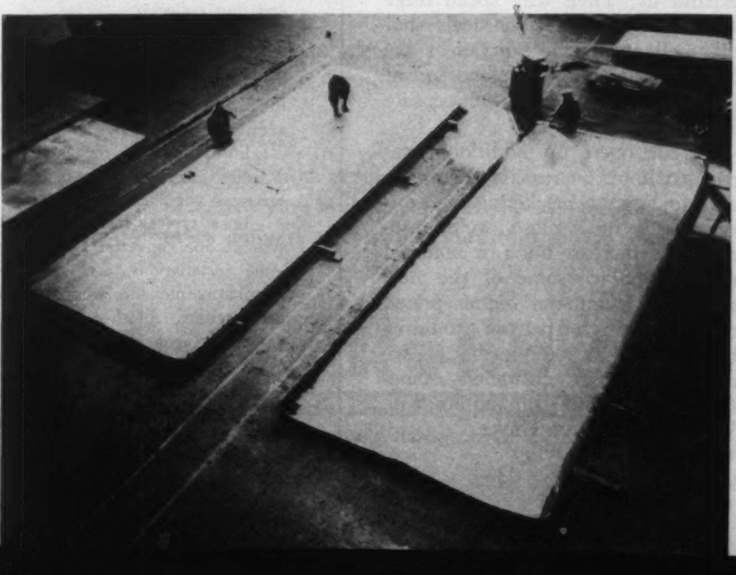
• **Knock on Wood** — Not content with competing in markets for metals, steelmen are seeking a share of markets usually reserved for nonmetallics. West Coast builders are erecting private homes with steel supporting members, such as I-beams and channels. Sections are constructed in the shop, minimizing more costly field erection. Use of steel gives architects more design freedom, permits long unobstructed spans, cantilever construction, and the erection of homes on hilly terrain. While such use of steel has been confined to individually constructed homes, large scale developers are toying with the idea.

Other building uses for steel also compete with wood. Steel can support the dry wall material used in some homes; the supports also function as molding strips, can be used with conventional framing. And steel has been used for a nailable studding that fits into a track, is locked in place by a chisel blow, has prepunched holes for wiring and piping. It's not used for bearing walls, but supports conventional wall materials.

Siding panels too are a possibility. Once again a look is being taken at porcelain coated steel for housing. It's easy to keep clean, the colors are permanent and attractive, and it's immune to termites, rats, and rot. Again, it competes with wood, but also with aluminum and asbestos-cement for exterior purposes.

In other areas, you can expect continuing research on such products as mill painted sheets, one coat enameling sheets (the new opened coil, annealing process is being applied to that type of material), double oriented electrical sheets, plastic coated pipe, and steels for nuclear applications where retained radioactivity is a problem.

• **Marketing Approach**—There's a



Steel companies combine to meet customer needs. Armco Steel Corp., Middletown, Ohio, cast extralarge ingots of stainless steel, which were rolled by Lukens Steel Co., Coatesville, Pa., and flame cut by G. O. Carlson Inc., Thorndale, Pa. Each plate weighs nearly 25 tons

new look in the marketing area too. To ascertain their customers' future requirements, leading steelmakers are calling on key accounts in major industries. At "development conferences" attended by top executives in engineering, research, sales, and purchasing, the customer outlines his needs to the supplier. If the steelmaker has something he thinks will solve the customer's problem, he offers to send a sample. But he'll also try to develop a new product to meet requirements. It's a new approach for the steel industry, though it has been applied elsewhere, and it shows that steelmakers are getting "market oriented" as well as "product oriented."

As the steel industry grew, steelmen were concerned mainly with maximum production. When capacity caught up with demand, they concentrated on production efficiency and cost reduction. If they made a new product, it was because a large customer asked them to do so. And if a product developed for one customer seemed to have other potential applications, they'd try to expand the market.

The onslaught of competitive materials made product development a matter of vital concern. Today, they're bringing out better products to hold their own in established markets, new products to keep surplus capacity occupied. In a buyers' market, it's essential to find out what the customer wants and what price he will pay.

Inevitably, steelmakers will produce structural materials that go farther and do more. Fabricators will use lighter sections, less tonnage to erect buildings. So the higher strength steels threaten to shrink the total tonnage rather than expand it. Then why spend huge sums to develop better steels that may sell at the same prices as the inferior ones they displace, or at premiums which can't compensate for tonnage losses?

"We'll open up additional capacity without increasing our physical capacity," a marketing man answers. "What's more, we'll automatically increase our raw material reserves. Since some of the new steels will command higher prices, our profit margins per ton should be better. But most important, if we don't offer our customers something better, our competitors will. We really have no choice."

Air Pollution Control Accented In Oxygen Steelmaking Era

Growing popularity of L-D converters, said to produce more dust and fumes than other metallurgical processes, increases the need for good gas cleaning equipment

EXISTING air pollution regulations and the prospect of more stringent legislation make selection and design of gas cleaning equipment extremely important in basic oxygen steelmaking.

J. D. Roehr, assistant chief technical engineer, Western Precipitation Div., Joy Mfg. Co., Los Angeles, is the source of that statement.

Electrostatic precipitators are widely accepted for handling the heavy stack discharge from oxygen blown vessels, adds Mr. Roehr.

- **The nature of effluent dust and fumes and gas flow variations make design of antipollution equipment difficult.**

Dust and fumes account for about 1.5 per cent of the charge, causing a concentration of about 10 grains per standard cubic foot, depending on the amount of dilution air admitted at the vessel hood. The dust contains a high percentage of submicron material. That offers a large light reflecting area and makes an objectionable plume.

Gas flow and dust emission are functions of the carbon burning rate. They reach their peak at about the same time.

- **The collection system must be designed to give satisfactory performance during peak periods.**

Lance oxygen converts carbon to carbon monoxide; air taken in between the vessel mouth and the hood completes combustion to carbon dioxide. When only enough air is used to complete combustion, temperature of effluent gases is close to 5000° F. A water jacketed hood drops that temperature to about 4300° F. Additional cooling equipment must be used to lower gas temperature to the safe operating range of the flues and dust collector.

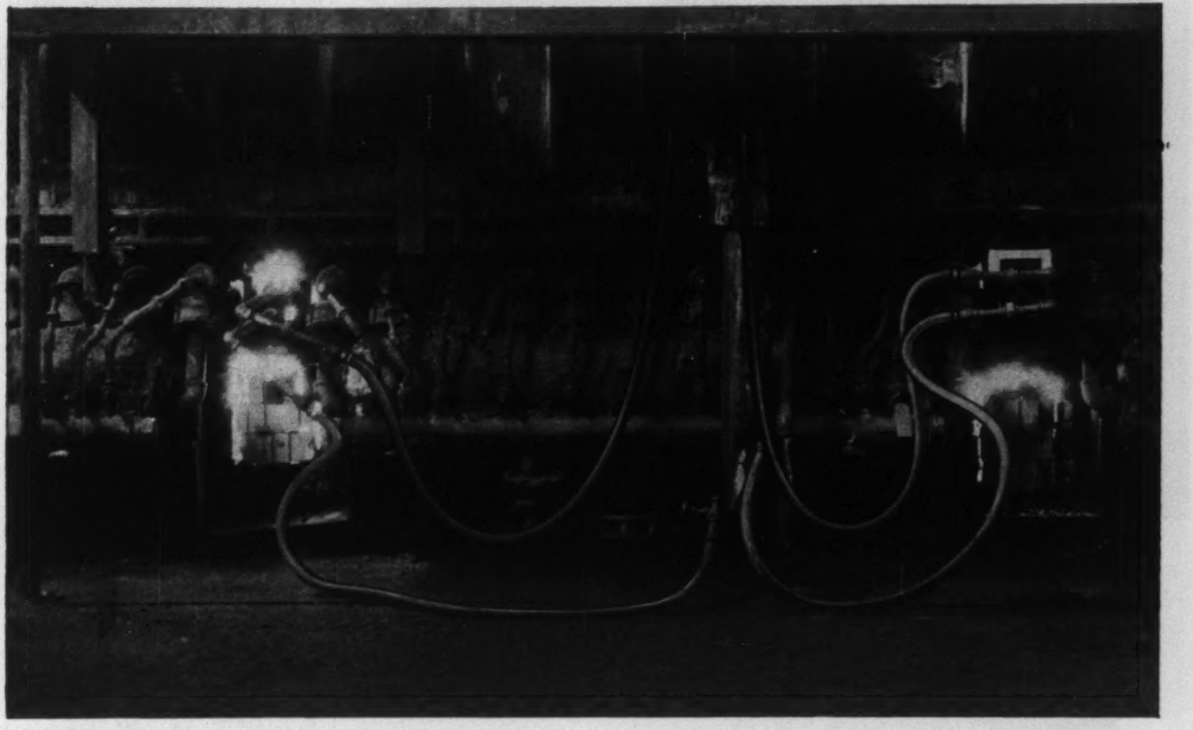
Some systems use minimum air dilution and a waste heat boiler to cool gases to 700° F; some use a water cooled hood and moderate dilution to lower the temperature to about 1400° F; others use no hood cooling and high dilution to bring gas temperature to about 1400° F. All require additional cooling by water evaporation.

Europeans and the Japanese often use waste heat boilers; in North America, water cooled hoods, supplementary sprays, and dry precipitators are more popular.

In a typical installation, two converters use the same fume control system; one converter operates while the other is down for relining. In some installations, each converter has its own cooling chamber. That permits maintenance work to be done on the chamber when the converter is being relined. Another system, developed by Western Precipitation, permits gases from converters and open hearths to be cleaned by the same precipitators.

PEERLESS WATER HOSE

BIG STEEL MILL DEPENDS on U. S. PEERLESS WATER HOSE to prevent pipe skid burn



In the Fretz-Moon furnace of this Kaiser Steel Mill in Fontana, Calif., one length of U. S. Peerless® Water Hose ("the hose with the good brown cover") carries cold water to the pipe skids, another length carries the return hot water—up to 200° F. If the hose should fail or kink, the pipe skids would burn up and costly repairs and downtime would follow.

Kaiser Steel depends on Peerless to safeguard valuable skids and keep its pipe mill in operation. U. S. Peerless is part of the complete line of U. S. Rubber's industrial hose, engineered for use and abuse.

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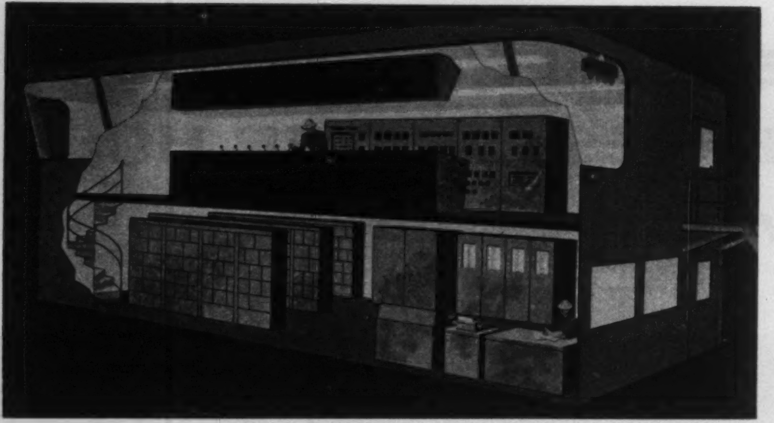
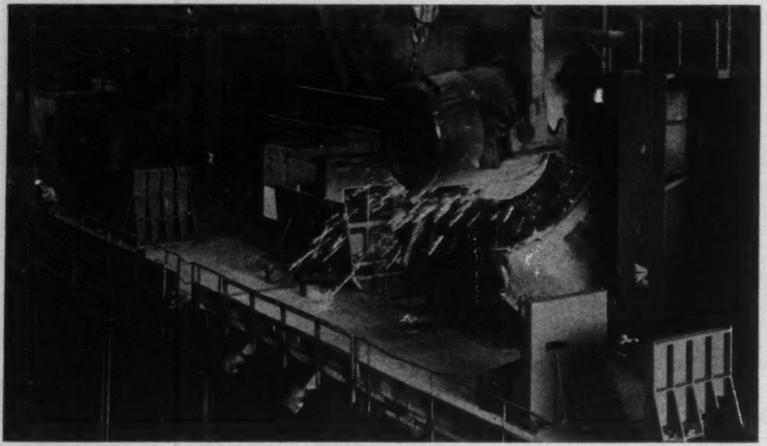
PROGRESS IN STEELMAKING



An automated mill setup suggested by engineers of General Electric Co. includes process control computers under the floor of the operator's pulpit



Hot metal is charged into an L-D furnace at the Fontana (Calif.) Works, Kaiser Steel Corp.

How U. S. Producers Fight Competition

STEELMAKERS in the U. S. and Canada are determined to keep their product competitive with other materials and with low priced steels from overseas.

They are spending heavily to update facilities. They're investing capital to apply recently proved processes and methods. And they're pushing research and development programs to make still better steel at no increase in production costs.

• Encouraged by successes with basic oxygen converters, steelmakers are installing larger vessels.

The size of vessels included in new U. S. installations has grown steadily. In 1954, two converters, each capable of turning out 60 tons a heat, were installed at Dominion Foundries & Steel Ltd., Hamilton, Ont. The same year three, 60 ton vessels were put into operation at McLouth Steel Corp., Trenton, Mich. In 1956, another 60 ton converter was installed at Dominion Foundries & Steel.

Two, 81 ton vessels were put into operation in 1957 at the Aliquippa (Pa.) Works of Jones & Laughlin Steel Corp.

The trend to larger L-D vessels continued in 1958, with the installation of two, 80 ton converters at McLouth; two, 101 ton vessels at Algoma Steel Corp. Ltd., Sault Ste. Marie, Ont.; and three, 100 ton units at the Fontana (Calif.) Works of Kaiser Steel Corp.

In 1959, two vessels with a capacity of 55 tons each were installed at Acme Steel Co., Riverdale, Ill., and a 110 ton unit was added at McLouth.

An L-D shop under construction at the Pueblo (Colo.) Works of Colorado Fuel & Iron Corp. will include two, 100 ton converters. Obsolete open hearth facilities at the Cleveland plant of Jones & Laughlin Steel Corp. will be replaced by two, 200 ton vessels. Units slated for installation at Great Lakes Steel Corp., Detroit, a division of National Steel Corp., will handle 250 ton heats. Another 55 ton vessel is to be added to the melting facilities at Acme Steel.

Several other steel companies in the U. S. are said to be interested in the Stora-Kaldo steelmaking process, which features an inclined converter, rotating at variable speeds, and lower oxygen pressures than the L-D method.

Engineers at Wheeling Steel Corp. expect to boost output from the company's two, bottom blown bessemers at the Steubenville Works and make open hearth grade steel by blowing with a mixture of oxygen and steam, instead of air.

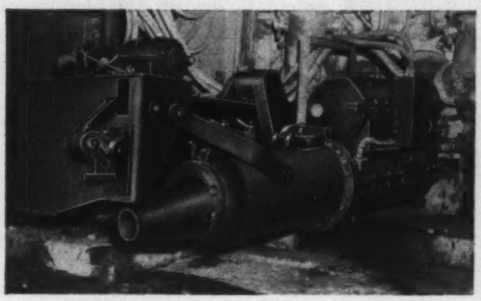
• Demand for tonnage oxygen is stimulated by other steelmaking applications.

Use of oxygen lances, inserted

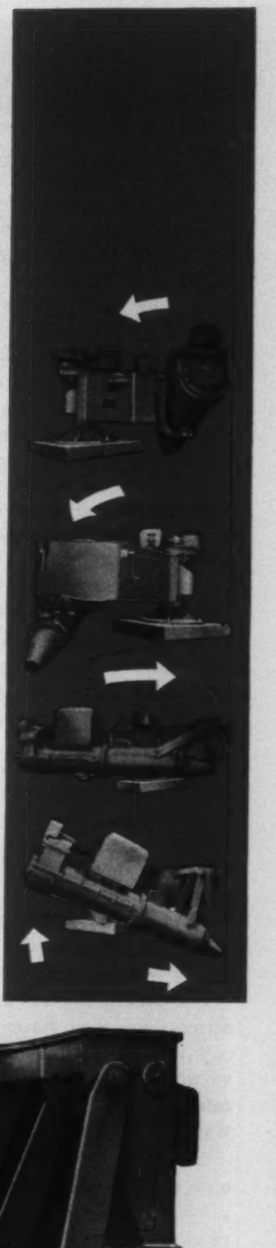
ACCURACY+POWER

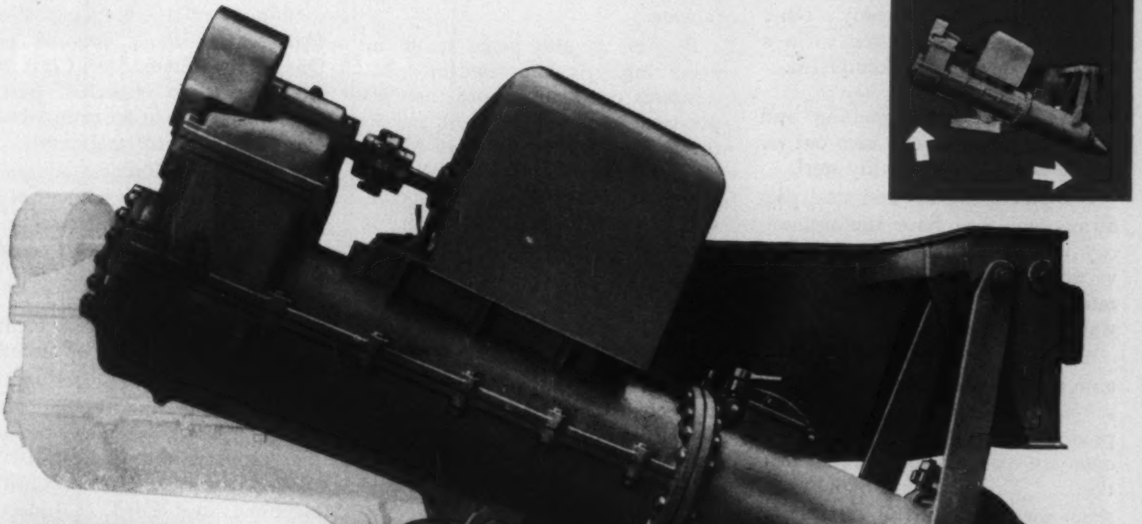
FOR MAINTAINING LONG TAPPING HOLES

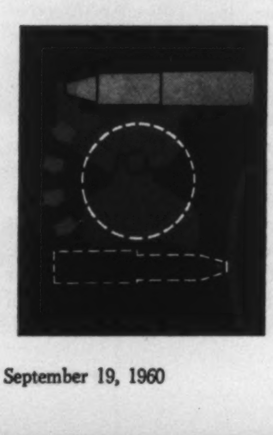
BAILEY CLAY GUNS



Precisely accurate due to unique mounting and 3-motor operation, Bailey Clay Guns furnish the high clay pressures (642 to 1150 psi) which are so necessary with the new coke-tar tapping hole mixes now being used on many furnaces. Designed for safety and reliability in blast furnace and large electric furnace applications, there are more than 170 in service. *Write for Bulletin.*







Clear of the tapping hole when not in use, Gun swings to the correct position for moving into the tapping hole.

WILLIAM M. **BAILEY** COMPANY · 1221 BANKSVILLE ROAD, PITTSBURGH 16, PA.

through open hearth wickets, and roof lances for decarbonization have helped keep the tonnage oxygen market healthy. The use of oxygen for flame enrichment in open hearths (fed through end burners or through roof lances held high above the furnace charge) is also popular. Oxygen-fuel lances, developed by Air Products Inc., Allentown, Pa., and used by the Ford Motor Co. Steel Div., Dearborn, Mich., look promising to steelmen.

Electric furnace heats are also speeded by oxygen lancing. And oxygen-fuel gas burners make for better melting in electrics, says A. L. Hodge, associate manager, gas process development, development laboratory, Linde Co., a division of Union Carbide Corp., New York. The laboratory is at Newark, N. J.

Oxygen enrichment of air blown into blast furnace tuyeres to increase hot metal output is gaining popularity. Example: Two blast furnaces are operating on enriched blast at Weirton Steel Co., Weirton, W. Va., a division of National Steel Corp. The company's other two stacks will use oxygen when a 600 ton a day plant is completed.

• Improved vacuum melting and treating equipment can turn out required quantities of quality steel.

Equipment makers and steel producers say they have the technology to turn out vacuum melted or vacuum treated steels. But users must decide what product they want and how much.

Vacuum induction and consumable electrode, vacuum arc furnaces are said to turn out extremely pure products, but capital and operating costs are too high for some applications. The need for high purity sometimes negates the importance of costs. Some producers offer vacuum induction melted steel—metal that is first air melted in an electric furnace, then remelted by the vacuum arc method; or material that is melted in a vacuum induction furnace, then remelted in a vacuum arc unit.

Vacuum degassed steel, less expensive to produce, offers higher purity than metal melted and teemed by conventional means. At Bethlehem Steel Co., Bethlehem, Pa., steel for mill rolls is degassed by pouring from one ladle into another, inside a vacuum chamber.

Cyclic degassing equipment developed in Germany is offered in the U. S. by Lectromelt Furnace Div., McGraw-Edison Co., Pittsburgh. Molten metal is forced from the ladle into a vacuum vessel, degassed, and returned to the ladle. Repetition of the cycle is said to minimize gas content in the steel. Degassing facilities are under construction at the Midland (Pa.) Works, Crucible Steel Co. of America, and at National Forge Co., Irvine, Pa.

• Sintering, pelletizing, and other beneficiating methods are helping steelmakers boost hot metal output.

Increasing demand for scientifically compounded, blast furnace burden is encouraging construction of more sinter plants. And the trend appears to be toward larger lines. Example: The single strand of a plant being built by Dravo Corp., Pittsburgh, at the Aliquippa (Pa.) Works of Jones & Laughlin Steel Corp., will be more than 13 ft wide.

Progress is also being made in pelletizing. Agglomerated ore concentrates containing more than 60 per cent iron are being shipped to the Rouge plant of the Ford Motor Co. Steel Div., Dearborn, Mich., by Humboldt Mining Co. Humboldt, which is near Marquette, Mich., is owned by Ford and Cleveland-Cliffs Iron Co. The Humboldt beneficiation process permits economical use of low grade, Northern Michigan ores.

Blast furnace design isn't being neglected. Experts on the subject say higher top pressures, shorter stacks, and all-beneficiated burdens will be standard in the future. And many furnaces will be fed by automatic stockhouses. Iron output will also be increased by the addition of combustibles to the blast air. Some companies are considering the use of natural gas. Others, like Pittsburgh Coke & Chemical Co., Pittsburgh, are using excess byproduct gases from coke ovens in their stacks.

Modern design features will be incorporated in stacks being built. A furnace that will turn out almost a million tons of hot metal a year at the Cleveland (Ohio) Works, Jones & Laughlin Steel Corp., will be blown with axial flow air turbines. It will have automatic skip charging and a semiautomatic stockhouse.

Another furnace, rated at 850,000 tons a year, is expected to go into operation at United States Steel's Duquesne (Pa.) Works in about two years. It is expected to operate at top pressures approaching 30 psi.

• Automatic devices and equipment are being used more in mill operation and quality control.

Steelmen are learning to use computers, x-ray, television, and recording equipment in the shaping and sorting of steel.

An electronic computer is included in the design of an 80 in., hot strip mill scheduled to produce coils in 1961 at Great Lakes Steel Corp., Detroit, a division of National Steel Corp. Computer equipment is included in the modernization plans of other steel companies.

A system that combines x-ray and television checks welded pipe for soundness at the National Works (McKeesport, Pa.), National Tube Div., United States Steel Corp. And television is an important part of equipment used to measure I-beams at a large Eastern steel plant.

Data accumulation equipment that keeps a running account of imperfections in coiled material is becoming more popular with tin plate producers.

• Research programs and facilities are getting their share of attention.

Expenditures for research and development continue to climb. Metallurgy, processing, new products, and ceramics are studied at a $5 million research center opened by Republic Steel Corp. at Independence, Ohio, in 1959. An Electromechanical Engineering building was dedicated in May at Monroeville, Pa., by United States Steel.

Some other R&D expansions that are underway: A research laboratory for Bethlehem Steel Co., near Bethlehem, Pa., which will centralize research work now done at 14 locations and a $6 million Technology Center being built near Pittsburgh by Crucible Steel Co. of America, to be completed in 1961.

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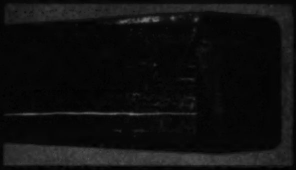

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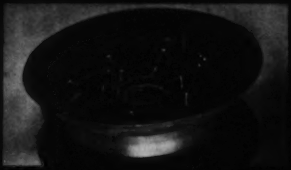

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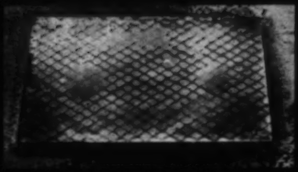

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The Promise Of the Sixties

What are the steel industry's greatest technological needs? How much technological progress can we expect in this decade?

You'll find answers to both questions in this forum of steel company executives. A number of developments are on the horizon, and, they add, you can also expect some surprises

FORUM

W. E. Mullestein

Vice President
Administration
Lukens Steel Co.
Coatesville, Pa.

STEEL manufacturers will continue to work toward development of an efficient method of reducing ore directly to steel. Meanwhile, more companies will move toward increased use of oxygen in the steel refining process. This will lead to changes in furnace types and should bring about appreciable economies in steel refinement and ingot production.

Material handling will assume more importance, as will the use of vacuum equipment in the melting and pouring of specialty steels.

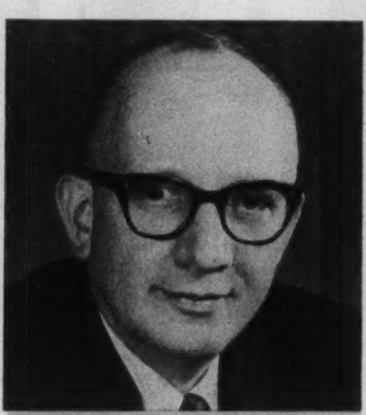
As the usage of sensitive, high strength, high and low temperature steels increases, it will be necessary to develop more effective ways of preparing them for rolling, forming, and shaping.

Great strides will be made in the mechanized control of the processing of steel through such operations as soaking pits, heat treating, cooling, and inspection. The use of data processing in production control will be tied in closely with facilities automation. Improvement in inspection techniques must likewise follow these developments in steel to satisfy the needs of customers.

This being the Space Age, the steel industry must direct a portion of its research program toward the development of higher strength steels, higher and lower temperature steels, and steels for specialized applications. Such steels must have properties that will permit fabrication to exacting standards and the maintenance of tolerances through rapidly changing cyclical conditions. At the same time, quality standards of fabrication and use must be developed to insure the successful application of these steels. More stringent controls over all manufacturing processes will be required to insure a high quality product for our customers.

With a need for greater uniformity in steels, it would be desirable to accelerate the trend toward continuous steelmaking.

With our movements farther above the earth and below the sea, there is great need for a metallurgical breakthrough . . . one which will bring about superstrength steels . . . that can be readily and economically formed, shaped, and joined . . . and be usable under conditions of extremely high and low temperatures.



Dr. Karl L. Fetters

Vice President
Research & Development
Youngstown Sheet & Tube Co.
Youngstown

STEEL faces increasing competition from steel imports and from aluminum, plastics, glass, and concrete. At the same time, increasing labor costs and unrealistic

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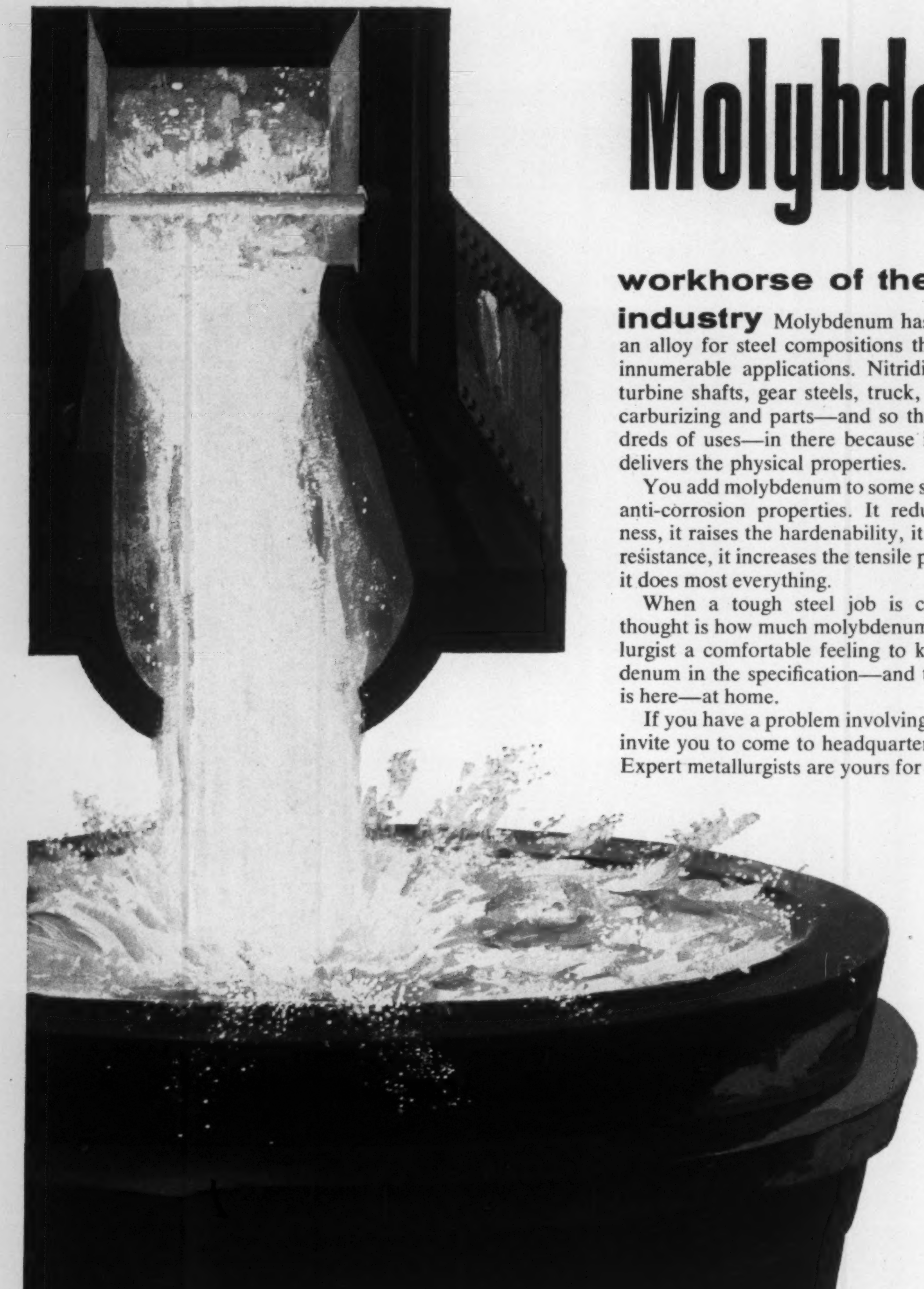

Molybdenum

workhorse of the metals industry

industry Molybdenum has found large use as an alloy for steel compositions that are employed in innumerable applications. Nitriding, stainless steels, turbine shafts, gear steels, truck, tractor, automotive carburizing and parts—and so the list grows to hundreds of uses—in there because it is dependable—it delivers the physical properties.

You add molybdenum to some steels because it adds anti-corrosion properties. It reduces temper brittleness, it raises the hardenability, it enhances the shock resistance, it increases the tensile properties—in short, it does most everything.

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depreciation allowances restrict the capital available for extensive plant rebuilding and expansion programs. Systematic and conservative modernization and technological improvements of present processes and development of new and improved steels to meet the changing customer requirements will be the steel pattern for the sixties. Research, quality, and service are important competitive tools to combat further losses of steel markets to substitute materials or foreign products.

Steel Industry Research

The steel industry has always been aggressive in the utilization of the findings of science and alert to product improvements. Operating engineering and plant metallurgical departments have quietly worked in practical applied research areas and have achieved many industrial gains for the most part, without the "fanfare" that has accompanied research in some other fields. Since World War II, the situation has changed. Formalized research has become a vital part of steel. The processes and the products of the modern steel industry can be described in the basic scientific domains of physical chemistry and solid state physics. Tomorrow's steel industry will evolve from basic and applied research in these fields. To an increasing degree, research will be reflected in the technology, the economics and the products of the steel industry. Never again will the U. S. have large, high quality, low cost reserves of raw material, low labor costs, and heavy demand for "common" steel products. Fundamental and applied research are charting the course for high performance, high quality steel products to be made from the available raw materials through the utilization of the most efficient and most economic processes.

New Processes

Progress here will be not so much revolutionary as evolutionary. Some new oxygen furnaces will be installed where new production is to be added or where ancient facilities must be abandoned, but the chief emphasis will be on the more efficient utilization of present plants with installation of such auxiliary facilities as may be needed.

Raw Materials

This area will be featured by careful selection of optimum mixes of coals for coke and of ores for the blast furnaces, much ore beneficiation, extensive use of self-fluxing sinter, pellets, nodules, and briquets.

Coke Plants

Look for improved blending and pulverization of coals, better and more consistent blast furnace coke, and the development of tests which will better define coke quality. Some developments in continuous coking will appear, but it's not likely that they will result in massive replacement of coke ovens in the decade ahead.

Blast Furnaces

Beneficiated burdens, top pressure, high blast temperatures, fuel injection, and computer control will bring iron production to or beyond the 3000-ton-per-day performance aim and will lower coke toward the 1250-lb-per-ton figure. Oxygen enrichment and moisture control of the blast will also be important control tools. Direct reduction processes will be researched and pilot planted, but they will not replace existing blast furnace plants in the sixties.

Steelmaking

The new oxygen furnaces, such as the LD and Kaldo, have many attractive features, but capital shortages with today's unrealistic depreciation allowances and limited profits will justify their installation only for new plants, major capacity expansion, or replacement of old and extremely inefficient facilities. Utilization of oxygen in the open hearth and increased handling facilities can be expected to more than double capacities of existing open hearth shops and improve their operating efficiency.

Continuous Casting

As in the instance of direct reduction, continuous casting will be researched and pilot planted, but it will be applied in production only in specialty applications and for some limited tonnage products. Vacuum-casting and vacuum-degassing, an innovation of ingot casting, can be expected to grow to meet some changing product requirements.

Rolling, Finishing Mills

Principal gains will be in the areas of improved controls resulting from utilization of computers, data logging, sensors, measuring devices, programing and feedback of logged data to the basic mill controls.

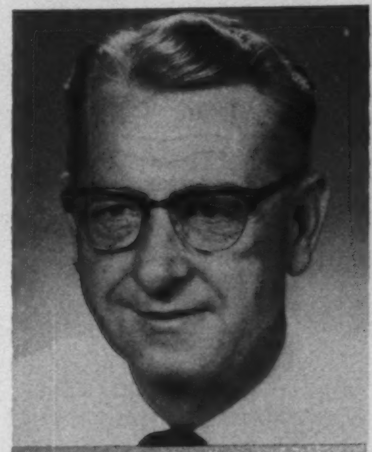
Products

There will be continuing development of higher strength and special purpose steels, increasing production of metallic and nonmetallic coated steel products. There will be product improvements and developments closely co-ordinated with customer needs as to gage, size, finish, strength, and the many other basic physical properties of steel.

Computers

Look for wide and expanding applications for process data logging, quality control, process control, and research. Also look for the streamlining of paperwork in ordering, billing, accounting, and inventory control.

FORUM



John Shank
Superintendent
Quality Control Dept.
Pueblo, Colo., Plant
Colorado Fuel & Iron Corp.

THE OXYGEN CONVERTER and the continuous casting method will be two of the dominating factors behind the great technological advances steelmaking is due to achieve during the present decade.

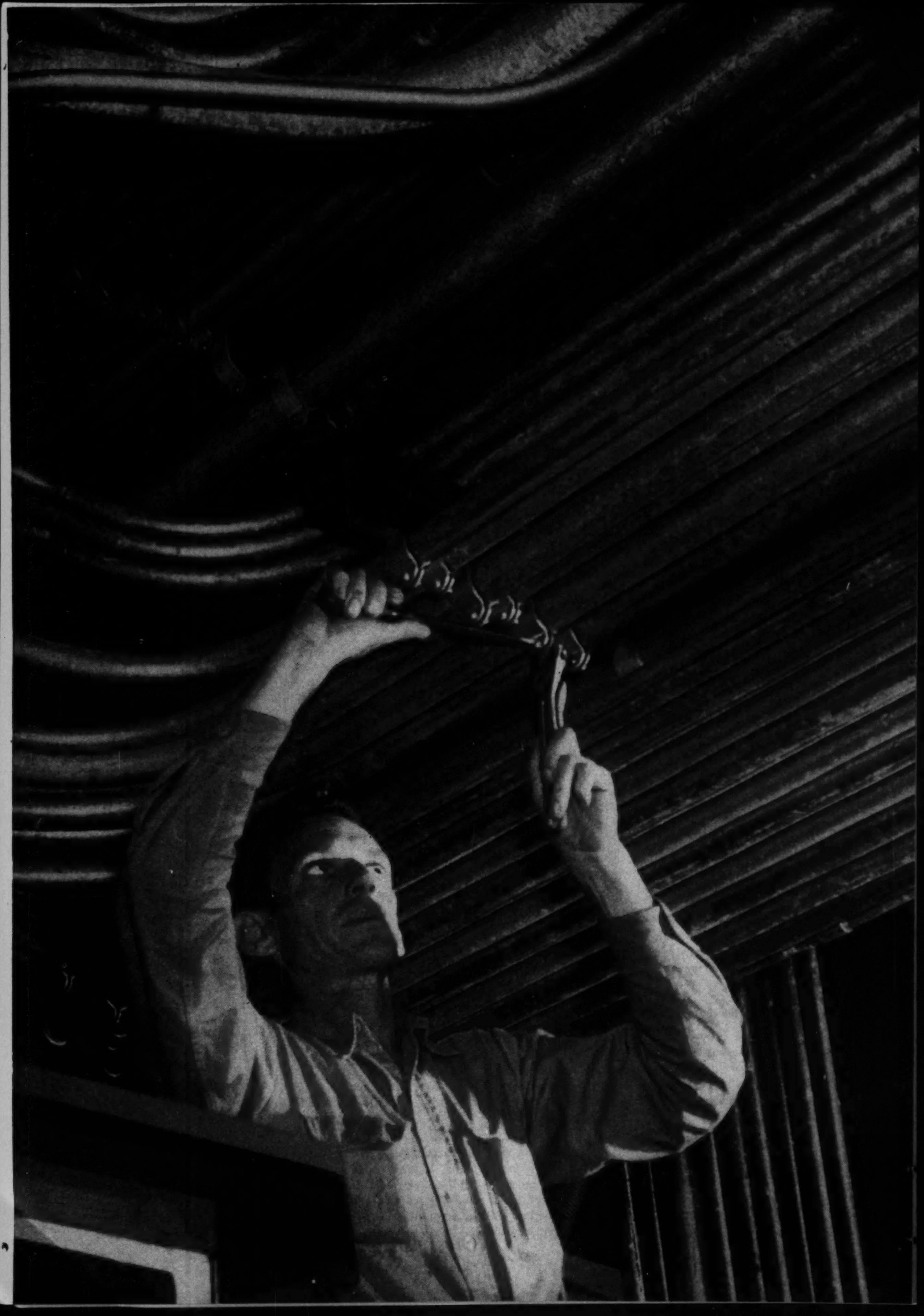
There is but little doubt that the oxygen converter technique—now in full development throughout the steel industry—will continue to grow in potential and variety of applications in the next few years. Continuous casting is still in its infancy in the U. S., but it will most certainly undergo tremendous improvements in the future and enjoy an ever increasing popularity.

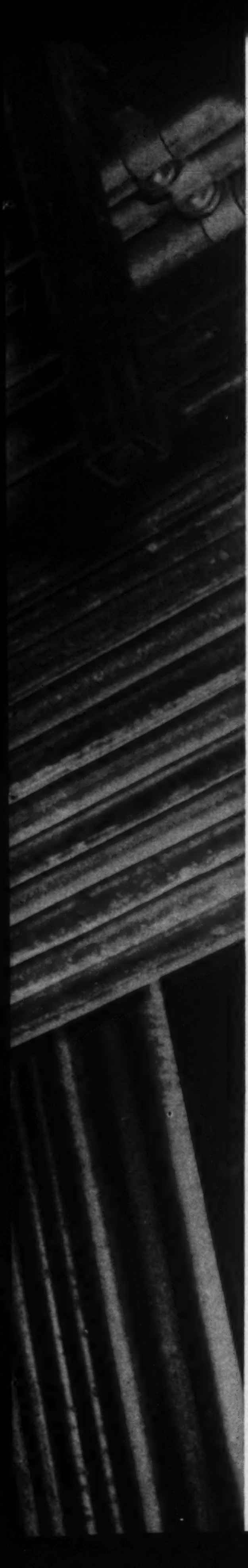
The introduction of electronic systems for ordering, gaging, automatically programing, and dimensional controls—as well as the adaption of computer techniques to process controls with nearly full automation of operating processes—will also be instrumental in shaping the steel of the future. Full impact of these revolutionary methods is yet to be felt.

Still another process which CF&I and other steelmakers intend to develop in the present decade . . . is the use of radioactivity. Applied to instrumentation methods, it will furnish additional, much needed information that is now determined by "relative" or "state of art" procedures.

With these technological advancements

(Please turn to Page 160)





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You can run Anaconda Durasheath from underground to overhead, and into ducts in one continuous run—without splicing. It is light, flexible, easy to handle, economically installed. For further information about Anaconda Durasheath write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

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- extra high resistance against ozone
- exceptional moisture resistance
- 22% more current-carrying capacity than 70 centigrade insulation

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FORUM

(*Continued from Page* 157)

will come intensified technological needs. But there is still a demand for practical applications of the existing wealth of theoretical knowledge of physics, physical metallurgy, and particularly physical chemistry to production methods and means.

The attainment of higher strength ratios is one of the technological needs of the future. Recently, there have been some significant developments in this area.

There's also a need for methods of eliminating undesirable or "tramp" elements, such as copper and tin, from steel. A simple means of minimizing hydrogen solution in steel, or a less cumbersome and expensive means of its removal, would be gratefully received.

George B. McMeans
Vice President-Operations
Kaiser Steel Corp.
Oakland, Calif.

THERE is no question but that the practice of upgrading and beneficiating of all raw materials used in the steelmaking process will be among the major technical advances of the 1960s.

Even those of us in the steel industry who have been deeply involved in the development of modern beneficiation technology are in for some surprises as new and more useful processes (from operating, economics, and scientific standpoints) are developed and utilized. To those not now concerned with beneficiation, the vast changes in progress will seem almost revolutionary.

Present beneficiation and upgrading methods will be expanded and modified to handle the widely divergent and generally lower grade raw material characteristics the steel industry increasingly finds itself faced with. Most assuredly, new and radical techniques will be brought from the laboratory into pilot plant stage and then into practical commercial utilization.

Fine grinding, metallurgical treatment, and subsequent reagglomeration, if necessary for processing, can be expected to receive a major share of attention. Pressure and temperature will be increased, and as a result, speeds of reaction will increase. Efficiencies of recovery can be expected to climb to increments closely approaching theoretical limits. Material handling techniques will receive appropriate attention as the movement of large quantities of materials through additional processing phases at lower cost becomes imperative.

Finally, it is safe to say that even the concept of beneficiation will undergo continual refinement, if not redefinition. It is indeed a fine line between the finish of beneficiation and the start of the classic chemical reactions and physical processes we collectively know as "steelmaking."

While the next ten years will see many other improvements in the steelmaking process, some as the result of bold new thinking along new frontiers, beneficiation is going to be in the forefront of the industry's efforts. We can expect to see a continued and increased effort to upgrade raw materials.

It seems to me that the greatest technological need of the steel industry for the decade ahead is in the area of making our product more efficient and satisfactory for the specified end use. One of the first steps toward this aim is the development of better in-plant systems of rapid, nondestructive, accurate, and economically feasible quality control.

While the development and refinement of measuring and testing techniques and instrumentation have been extremely rapid in the last ten years, there is much improvement to be sought. We want to sense and measure all aspects of quality prior to the last finishing operation. This ability to detect minute changes in the characteristics of the finished steel as it is being produced is in itself a difficult proposition. But we want to see even greater development in the area of conversion of this signal into instantaneous mechanical or metallurgical corrections. The problem is great; the rewards, in terms of increased efficiency, lower cost, reduced waste, and better quality of product, will be high.

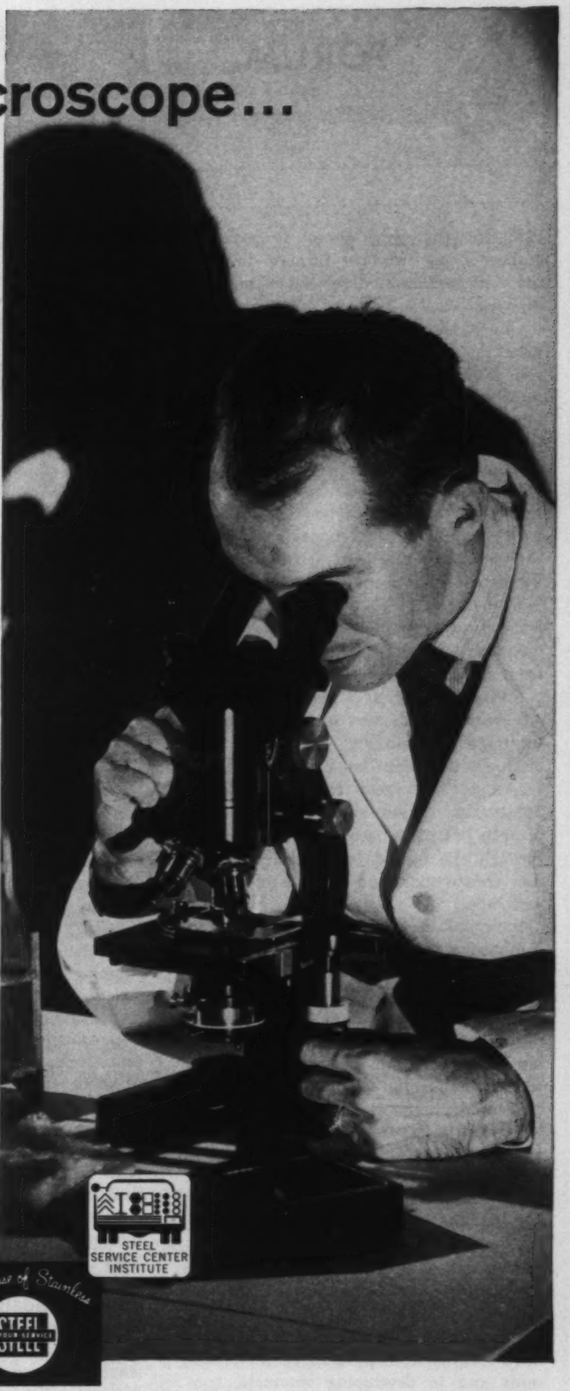
Research expenditures and scientific effort must be made toward new products —toward those steel products which will do a better job for existing end uses. It is self-evident that new end uses, such as rocketry, will require their own kinds of specialized research. I have in mind, however, improving the product for normal and everyday end uses. Toward this end, the researchers of the 1960s must become more familiar with what is actually needed—more aware of what the end use will actually be. New specifications will be written as a result of this increased interchange of information between supplier and producer.

Mechanical and machine development must likewise accompany the push toward a more efficient end product. It will not be enough to design for a faster rate; the product must continue to provide increased satisfaction for a wider variety of applications. After all, steel is the true miracle metal of our age; the challenge for us is to fully develop its potential.

Dr. James B. Austin
Admin. Vice President
Research & Technology
United States Steel Corp.
Pittsburgh

THE IMPORTANCE of developments during the past decade concerning the use of beneficiated and agglomerated iron ores and improved coke in blast furnace burdens will be fully evidenced during the next ten years. The application of physical and chemical quality control to the blast furnace burden materials, when augmented by high top pressure operation, blast temperatures greater than 1600° F, and injection of supplementary fuels through the tuyeres, will substantially enhance the position of the blast furnace as the most economical method for recovering iron from its ores. Indeed, it will be surprising if the progress in blast furnace performance during the next ten years does not far exceed the 15 per cent improvement obtained during the

You don't need a microscope...



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past ten years with respect to both the output of pig iron per furnace day and the coke consumption per ton of pig iron produced.

One hundred years ago, Sir Henry Bessemer foresaw the potential of using oxygen instead of air or iron ore in steelmaking furnaces. The fruition of Bessemer's dream is now being realized as the result of improvements in cryogenic technology and the installation of numerous plants for the economical manufacture of high purity oxygen on the large scale required for steelmaking. During the next ten years, oxygen steelmaking furnaces will be installed to replace many worn-out and obsolete open hearth shops and to expand steelmaking capacity in favorably situated plants. However, the open hearth process will likely retain its dominant position as a steelmaking method because of its versatility with respect to usage of scrap and hot metal, types of fuels that can be burned, and the grades of steel that can be produced. Substantial improvement in the output of open hearth furnaces has been obtained through the use of basic refractories for roof construction and the use of oxygen roof lances.

Improved handling of materials and combustion control, when combined with the use of basic roofs and oxygen roof lances, have led to longer furnace life, decreased fuel consumption, and shorter heat time, so that the 12 hours from tap to tap common ten years ago is no longer acceptable.

Presently, about one-fourth of the American open hearth furnaces are maintaining a faster pace than 10 hours from tap to tap; several large modern shops are begining to approach 8 hour heat time. During the next ten years, the improvements that will be attained in open hearth performance are expected to be even more outstanding than the accomplishments of the past ten years.

In the field of shaping steel, great strides have been made in speeding up the rolling mills and in developing automatic controls for them. The years ahead will see even greater advances in improved control systems.

Among the greatest technological needs of the steel industry are the achievement of great production from existing facilities, improvement of raw materials, and a greater degree of automatic control of all processes to increase the yield and to attain ever higher uniformity of quality of products.

Dr. Julius H. Strassburger

Vice President

Research & Development
National Steel Corp.
Pittsburgh

DURING the past decade, the development of new methods and processes in iron and steelmaking has caused a rapid change in both technology and productivity.

Raw Materials

There is probably no field in the iron and steel industry where so much progress has been made as in the improvement of raw materials. In the past, iron ores were charged into blast furnaces as direct shipping ores from the mines. With beneficiation, low grade ores have been made into high grade concentrates with iron contents ranging from 55 to 68 per cent compared with direct shipping ores of about 45 to 53 per cent iron content. The production of sinter and pelletized iron ore is now revolutionizing blast furnace practice. Sinter, which often contains a major part, if not all, of the flux materials for the furnace burden, together with pellets, has made possible increases in daily iron production of more than 50 per cent; proportionate decreases in coke consumption result in lower iron costs. In the future, as ore bodies of heterogeneous structure are opened up, new beneficiation methods, including magnetic roasting and partial direct reduction, will probably be used.

With the reserves of low sulfur coking coals limited, the development of new continuous coking and desulfurization methods for the production of coke from marginal coals will take place. Our entire concept of blast furnace coke quality, shape, and sizing will probably change during the next decade.

Blast Furnace Practice

With the improved burden, the use of new techniques, including elevated blast temperatures with gaseous, liquid, or solid fuel injection, together with moisture and oxygen additions to the blast, are being used for both decreased coke consumption and increased productivity. The use of higher top pressures with possible power recovery of the energy of the top gases by gas turbines is another expected development. It is our opinion that the present average production rate of blast furnaces will be doubled over their present rating during the next decade.

Direct Reduction Processes

There is no doubt that direct reduction processes will be developed, using any one of several methods under study, so that iron ore can be directly reduced by reformed gas into so-called sponge iron, or possibly into molten metal by subsequent use of electric furnaces or other means. Our studies indicate that this type operation will be economical in areas where gas will be available at relatively low cost compared with blast furnace coke, and where there is little scrap available. Actually, the direct reduction processes will be used in remote steelmaking areas and not in the large, integrated steel operations.

Steelmaking

Low cost tonnage oxygen has had a definite impact on steelmaking. At the present time, the established open hearth method of making steel, which has accounted for the major part of steel production during the last 50 years, is being challenged by the basic oxygen processes. They consist of the top blown oxygen process with oxygen jetted down on top of the hot metal in a converter shaped vessel, as well as the rotary processes as developed in Sweden and Germany. All these methods depend upon the oxygen oxidizing the impurities in the iron to create the necessary heat for melting and refining. They require practically no fossil fuels in basic steel production.

The electric furnace, which in the past has been considered a means of producing high quality alloy steels and specialty products, can become a larger source of steel production if electric power can be delivered to the melting furnaces at a sufficiently low cost—possibly from nuclear sources.

Considerable progress is anticipated in the development of super-high-strength steels utilizing new techniques, including the use of ultrapure alloying metals—such as can be produced by the vacuum, consumable electrode refining methods.

Steel Processing

Continuous casting of the molten steel into semifinished slabs or blooms is being developed, and the progress of this work, together with the advent of cyclic steel melting, indicates that within the next decade continuous casting may displace

(Please turn to Page 166)

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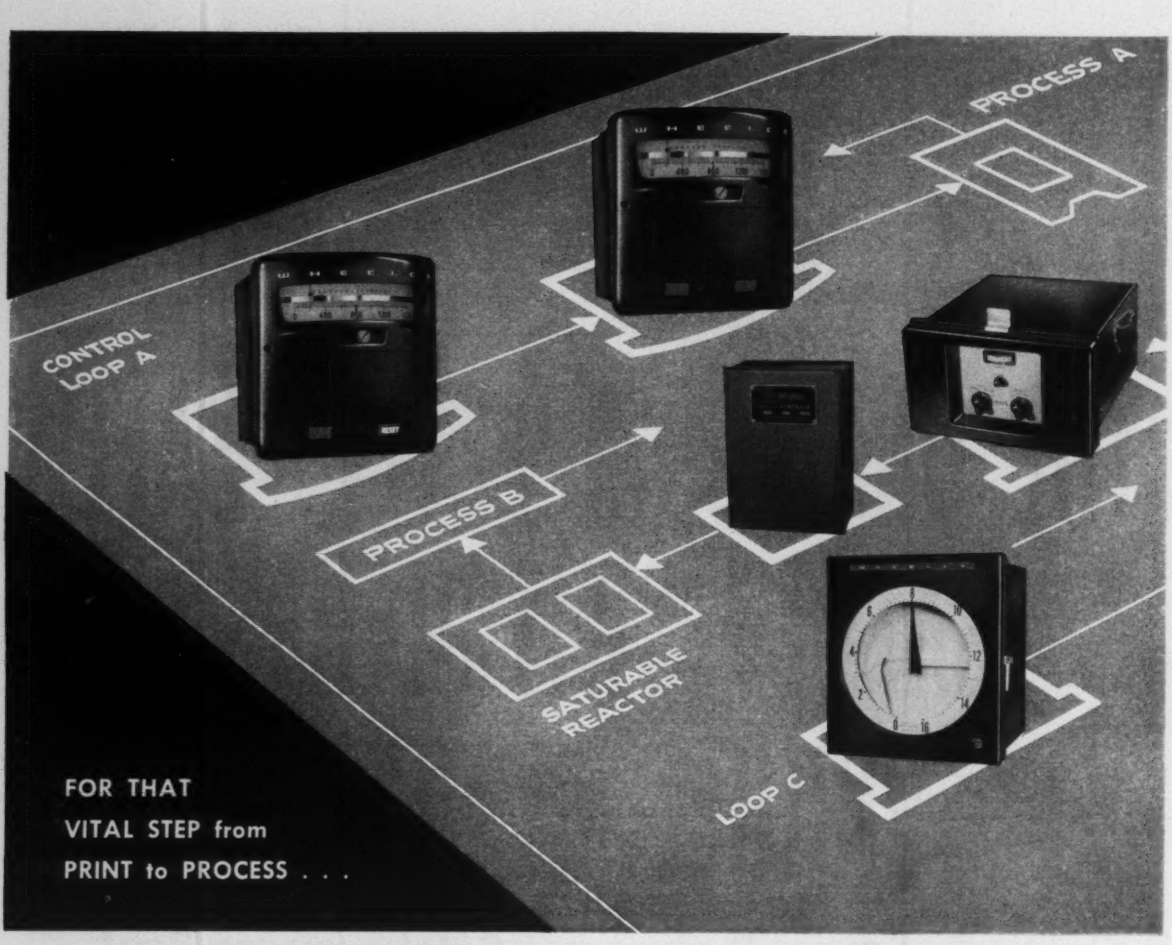
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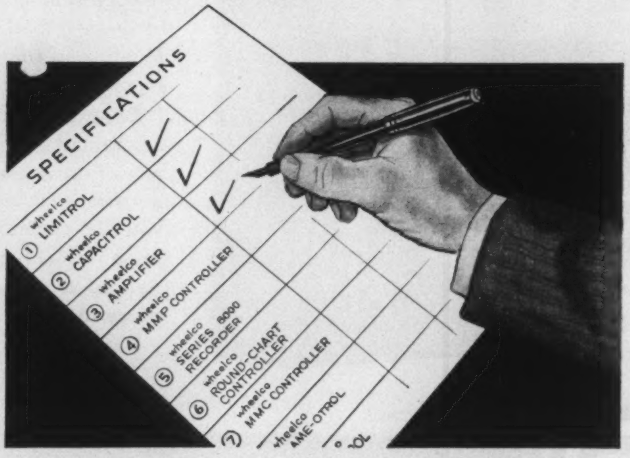
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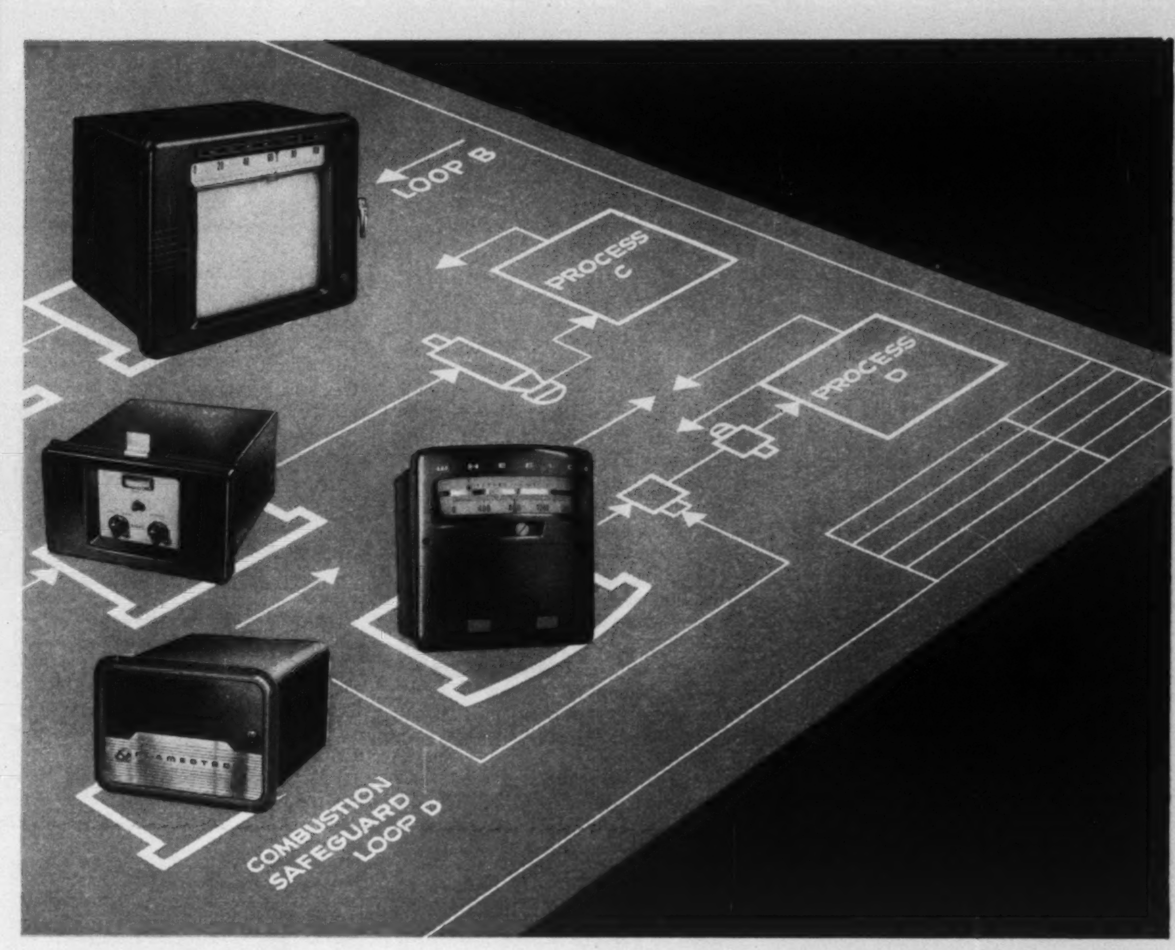

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(*Continued from Page* 162)

rolling mills in the production of semifinished steel material.

Hot mills, including annealing, coating, and other processing lines, have been improved via high speed automated machinery. Processing speeds and metallurgical control will be further improved, and the use of open anneal with gas metallurgy could open up new fields in the metallurgical processing of steel.

Automation

The development of new methods of steelmaking, covering iron ore, coke, blast furnaces, direct reduction processes, steelmaking, rolling, finishing, and the coating of steel, will require decisions in operation beyond the speed of the human hand. This points to the development of computer control for these industrial processes. Sensing devices are being, and will be, developed to feed the necessary information into computers, so that changes can be made in fractions of seconds to control processes.

The greatest technological need of the steel industry is more extensive research to obtain a better understanding of the making of steels with new properties, so that steel can have a wider use and compete with other metals.

Dr. William R. Kiessel

Manager, Applied Research

Steel Div.
Ford Motor Co.
Dearborn, Mich.

WE SEE a need for improved product uniformity both in automotive sheets for stamping operations and in all other intermediate products and raw materials of the steelmaking process.

For example, differences in die springback caused by variations in steel gage and hardness increase the problem of assembly fits. Improved control will permit the reduction of the average gage thickness without going beyond safe tolerance limits, thereby reducing vehicle weights. Stamping plant efficiency will be increased. This all adds up to a better automobile for the public.

Emphasis on improved uniformity of steel products will in turn require improved uniformity and quality control at all stages of the steelmaking process, including raw materials. This will result in benefits to steelmakers through the reduction of scrap and waste and improved yield, and also by a higher throughput because processing times will be minimized with uniform materials.

We are going to see increased co-operation between users and suppliers in establishing economic limits within which the supplier can improve product uniformity. This will result in a greater degree of automation and instrumentation in steelmaking operations and in customer plants. However, before these methods of attaining product uniformity can be achieved, there must be a more thorough and fundamental understanding of the physics and chemistry of the processes and an even greater attitude of research orientation developed within operations.

William H. Holman

Assistant Vice President

Operations Div.
Wheeling Steel Corp.
Wheeling, W. Va.

THE LAST DECADE has seen carbon steels rise to new heights of performance. The next decade will doubtless see them used in ever lighter sections without sacrifice of strength, formability, or durability.

Those objectives will be accomplished by continuing betterment of materials charged into blast furnaces and process controls through steelmaking and rolling units. No single phase, from raw material to end product, can be ignored if a successful technical-economic payoff is to be had.

In this "major tonnage component" of steel production, beneficiating of raw materials, upgrading of fuels, maximum use of oxygen to better production, faster and more automatic rolling mills, and many other refinements will play a part under an alert operating organization aided by a competent "engineering and metallurgical" group.

Combine all the above (and none can be ignored) with a full utilization of production facilities and move the product to market, and you have it made—nothing less will be good enough in the decade ahead.

The pattern of the 1960s with all its built-in fixed charges, fringes, and so forth won't pay off with the nineteenth century concept of intermittent operations.

Making the grade will be directly commensurate with continuity of performance in the 1960s.

T. F. Olt

Vice President

Research & Technology
Armco Steel Corp.
Middletown, Ohio

NEW AND IMPROVED processes and techniques for making and shaping steel during this decade will probably be evolutionary rather than revolutionary in character.

The various aspects of upgrading the

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In attempting to offer new savings to electric furnace operators, in 1957, NATIONAL CARBON in a joint effort with Evans Products Company, developed damage-free gondola cars for electrode shipments. This equipment requires minimum dunnage yet carries substantially larger loads. Unloading is quick and simple. Recently, in co-operation with a leading railroad, NATIONAL CARBON is making west coast shipments of electrodes 20 inches in diameter and smaller in new high-side, damage-free gondola cars. The increased capacity of these cars makes possible a reduced transcontinental freight rate on shipments in excess of 110,000 pounds.

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raw materials used in the smelting of pig iron are receiving a great amount of attention, not only in the field of ore beneficiation and agglomeration but also in the cleaning and preparation of coal and sizing of coke and stone. The development of improved operating techniques for blast furnaces, to take advantage of the greater latitude of operation provided by improved charges, will accompany these changes and result in increased productivity and decreased rate of coke usage.

Various oxygen steelmaking processes are being developed rapidly. Production increases obtainable with open hearth furnaces, via oxygen jets in conjunction with basic roofs and higher fuel rates, will tend to retard the installation of fuelless oxygen steelmaking converters (such as L-D and Kaldo). One exception: Where new capacity is needed beyond that attainable through the speeding up of modern open hearths.

There will be a great deal learned about continuous casting of steel now that several major installations for casting wide slabs are under construction abroad. It still must be determined whether such casting procedures can be economically incorporated into modern steelmaking technology.

Shaping is another area that will receive major attention during the current decade.

Many rolling mills are now being automated in conjunction with increases in rolling speeds. The result will be products with greater uniformity in properties and decreased dimensional variation.

With the changes that have taken place in the export-import balance of steel products over the last several years, along with progress in other constructional materials, it would appear that the greatest present technological needs of the steel industry lie in three areas:

1. Development of processes and techniques yielding greatly increased production rates and decreased manpower requirements.

2. Development of processes and techniques requiring appreciably less investment per unit output.

3. Acceleration of the development of new and more sophisticated products and material utilization . . . to compete better with other constructional materials, such as plastics and aluminum, as well as with steel products that originate in other countries.

E. R. Johnson
Assistant President
& First Vice President
Republic Steel Corp.
Cleveland

INCREASED competition both within and without our national boundaries makes technological advance and improved efficiency absolute musts in the coming decade.

At one time, steel was the only material that could be specified for many applications. Now substitute or competitive materials can be obtained. Foreign steels continue to come into our land, and the cost advantages they have in some areas have made them extremely difficult competition.

In the coming decade, raw materials must continue to improve in quality. The use of natural raw materials direct from the earth will continue to diminish. Agglomerates will gain steadily in favor. Beneficiation will become more widespread. Iron content in blast furnace feed will move higher.

Blast furnace fuels will improve as oxygen and natural gas gain wider acceptance and the furnaces are equipped to withstand higher temperatures.

Steelmaking will be radically different from that which we knew in the forties and fifties. The gains made by oxygen in recent years will continue and have growing impact as the sixties fade away. Just where it will gain its greatest acceptance is hard to judge. Whether the oxygen converter will outstrip the use of oxygen in the open hearth is difficult to say. Both, however, will make great forward strides. In the coming decade, there will be many significant changes in the design of melting furnaces. Vacuum melting and consumable electrode electric furnaces will gain favor for special requirements.

The increased use of higher temperatures will require better refractories, and, ten years hence, refractories will be able to withstand temperatures far beyond what we know today. The demands for quality, for tolerances, for strength have increased steadily in recent years, and they will continue to increase as new applications for steel are found. As scientists probe deeply into space, even more exacting specifications will be required from the steel industry.

As melting processes improve, so too must finishing. Rolling mills will become faster, capable of producing not only better surface and heavier coils but also closer tolerances of width and gage.

The customer will be in the driver's seat, and to satisfy him, the steel industry will enjoy a decade of great progress.

Oxygen Will Boost Output Of Italian Open Hearths

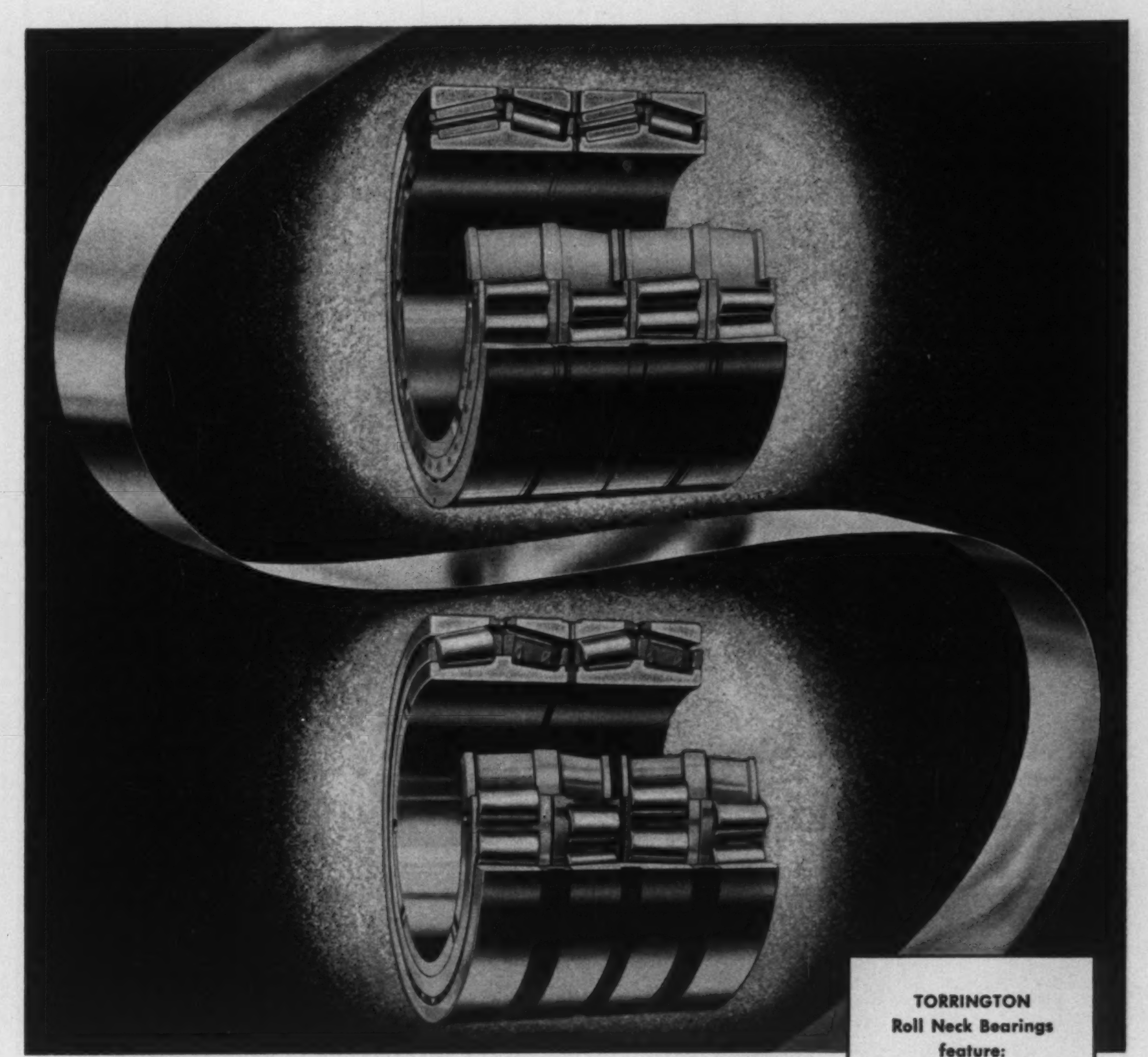
Steel production at Cornigliano SpA, Genoa, Italy, is expected to shoot from 1 million to 2 million metric tons a year in 1961 when the company converts its six open hearth furnaces to oxygen steelmaking. A 426 ton a day oxygen facility will be built at the Genoa plant by Air Products Ltd., a British affiliate of Air Products Inc., Allentown, Pa.

The company will install basic roofs on its open hearths, and about 1200 cu ft of oxygen will be used for every ton of steel produced. The gas will be added during combustion to boost heat input and injected through roof lances during the refining process.

The oxygen plant will include two generating units. Storage for 610 tons of supercold liquid oxygen and 910,000 cu ft of high pressure, gaseous oxygen will also be provided. Most of the output will be in gaseous form, but a substantial amount of liquid oxygen, at −297° F, will be produced and stored as a backup supply. The facility will also turn out nitrogen of 99 per cent purity.

Cornigliano has experimented with oxygen steelmaking techniques for several years, but an Air Products official says the Genoa facility is the first tonnage plant for the Italian steel industry.

Oxygen from the plant will also be used by another steel producer in the Genoa area, Societa, Italiana Acciaierie Cornigliano SpA.



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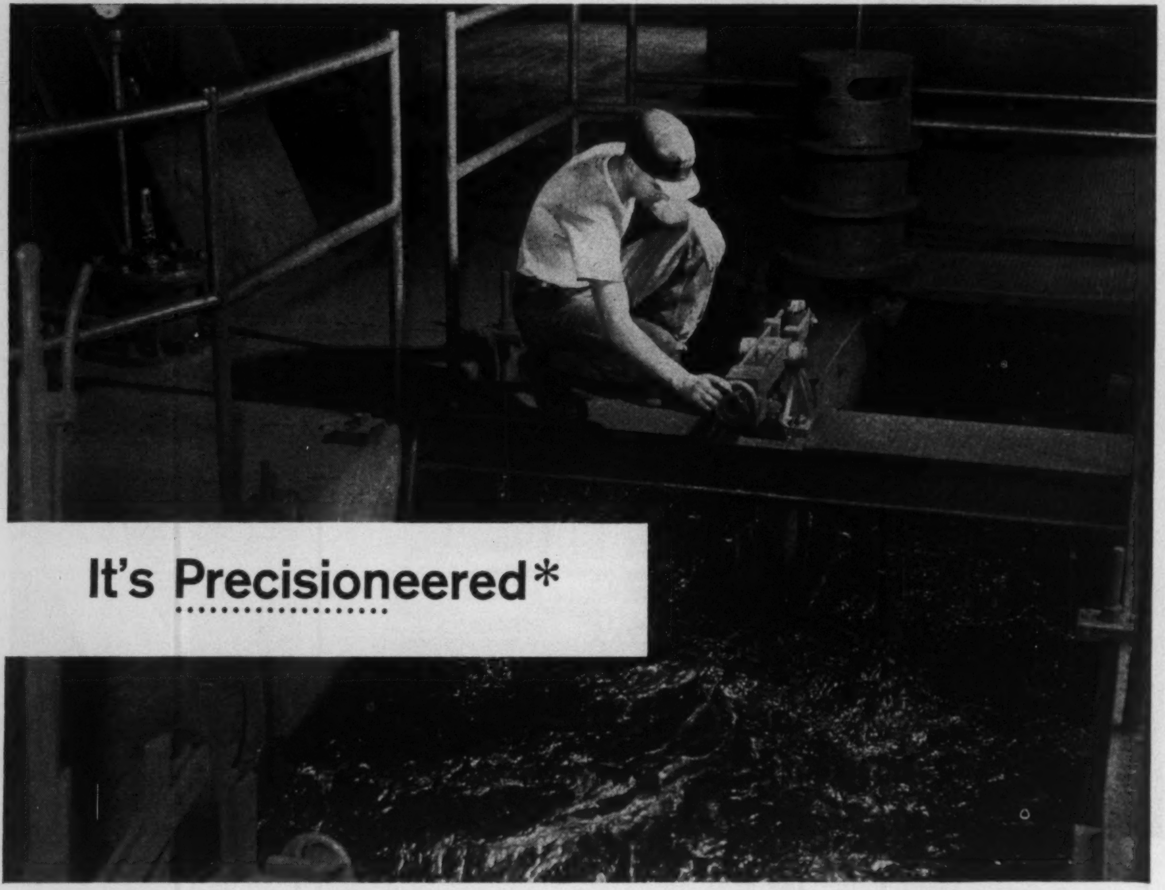

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" . . . Russians expect to surpass us in product quality and worker productivity in the iron and steel industry during the next five to ten years, by developing and applying advanced automation theory and techniques . . . "

" . . . They say their automation engineers aren't concerned with one to three year profit problems or tangible designs for the present; their work isn't charged to the cost of steel, but to economic development and government . . . "

American Automation Expert Evaluates Russian Efforts

Technological advancement gets priority over short term cost position and rapid improvement of living standards, says General Electric's W. E. Miller

SOVIET RUSSIA is staking her future on automation and the systems engineer, says W. E. Miller, manager, metal rolling and process engineering, General Electric Co., Schenectady, N. Y.

Mr. Miller attended the first congress of the International Federation of Automatic Control in Moscow. That provided an opportunity for first hand study of the Soviet attitude toward engineering education and process control.

"The Russians expect advanced automation theory and techniques to raise product quality and worker productivity to levels above those in the Western world," says Mr. Miller. "M. I. Korobko, deputy director and chief engineer at the Institute of Automation, Kiev, gave the impression that such an operation would take five to ten years."

• Russians are willing to sacrifice rapid improvement in living standards for technological progress.

"Soviet engineering management realizes that all-out efforts toward technological advancement will delay rapid improvement of living standards, and affect short term cost position," Mr. Miller says.

"But Mr. Korobko is convinced that such a long term program is worth the sacrifices. He told me: 'In the West, you must pay most attention to the one to three year profit. Cost is relative to your objectives. Our institute, on the other hand, is charged only to work for the best long term engineering solutions—not to produce tangible designs for the present. The cost of our operation isn't charged to the cost of the steel, but to the cost of economic development.' "

• Many Soviet engineers examine over-all systems problems. They try to apply theory and engineering concepts to find the best system solutions.

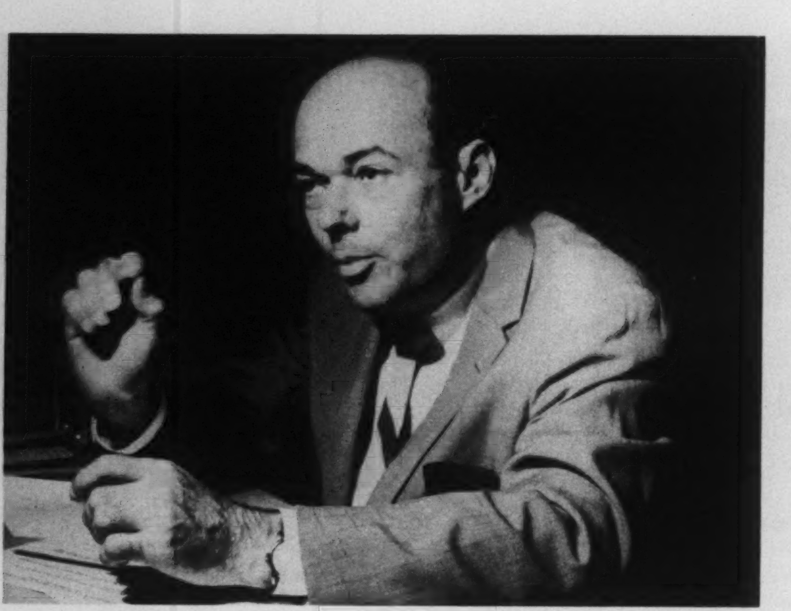
Assignment of engineering manpower is based on the evaluation of relative, long term, economic worth of each industry. And the metallurgical industry is considered most important in the USSR.

At the Institute of Automation, which employs 2000 engineers and technicians, 1700 are graduate engineers, says Mr. Korobko. Of that number, 600 work on process and system development and on design problems in the iron and steel industry. Planned: Another 400 engineers—all in the metallurgical industries field.

• A system or process that proves itself is universally accepted.

"Engineers working on processes and systems for metallurgical industries seem to have considerable academic freedom in their work," says Mr. Miller. "At the Institute of Automation & Telemechanics, in Moscow, engineers are studying the sintering process with a lot of liberty in the scope of their investigations and their basic approaches.

"After evaluation of published material, a process is defined mathematically and computer simulations are developed. Control approaches



" . . . Soviet definitions are broader—automation may describe an automatic conveyor carrying work between hand assembly stations, or a completely automatic line. Computer controls may be simple analog comparators or integrating circuits for special functions, or ingenious optimizing systems . . . "

are synthesized and defined in mathematical terms. Then principles are tested and proved with working models. The models are checked in conjunction with the process simulation, and complete system performance is noted.

"Considerable attention is being focused on the development of laboratory test equipment that can optimize the design of those systems automatically. Later, the same techniques may become usable in the computer control of processes. Ingenious computing techniques are being developed to solve specific process control problems.

"Such work is usually done at the Institute of Automation & Telemechanics or at the Institute of Automation.

"Where several approaches are possible, and when engineers differ in their choice of the one to be applied, all methods are apparently investigated simultaneously by a number of engineers. A prototype is then designed and tested. If tests are successful and the system is selected for use, it may be produced in quantity and applied throughout the Soviet steel industry."

About Mr. Miller:

Studied electrical engineering at University of California, Berkeley, Calif.; was graduated with honors in 1939. Joined General Electric Co. and was assigned to the Industry Control Dept. Promoted to test foreman, then to department night head of test.

Worked six years in the Large Motor & Generator Dept., as a design engineer. Became an application engineer for Metal Rolling & Processing Industries in 1946. Received General Electric Coffin Award in 1951 for systems engineering design and analysis of drive equipment on tandem, cold reduction mills. Accepted present position in 1952.

Licensed as a professional engineer in the state of New York. Member of the Association of Iron & Steel Engineers and the American Institute of Electrical Engineers.

- **The terms "automation" and "computer" seem to have broader meanings in Russia.**

"The Soviets might say a facility is automated if work is transported automatically by a conveyor from one handwork station to another," Mr. Miller says. "A computer control system might consist of a simple analog comparator or integrating circuit for some special function. Or a process could be completely automatic, employing ingenious, special purpose, computing techniques. It isn't possible to make broad comparisons between automated steel plants in Russia and in the West without comparing details of their plants and ours or reading technical papers completely.

"We saw no evidence and heard no claims indicating the use of online, process, digital control computers in the Russian steel industry. But completely automated manufacturing facilities (in motor manufacturing plants) have been visited by Western engineers."

- **Russians say they've made progress in the automation of several steel plant processes.**

Blast furnace automation may be nearer reality in Russia than in the U. S., says Mr. Miller, and ultrasonic equipment is being used for large scale inspection of slabs and plates for slag inclusions and laminations in one Soviet steel plant. Such equipment was proposed some years ago by General Electric, but it apparently has not been used for that purpose in the U. S.

An automatic gage control system for a tandem cold mill developed at the Institute of Automation & Telemechanics is described in a technical paper by A. B. Chelyustkin, deputy director at the institute. The system seems capable of good performance, but a feed-forward feature (using a magnetic tape transport) is said to introduce control complications that might not be warranted by the slight improvement in performance.

Soviet engineers are said to be engaged in optimizing the operation of automatic, reversing, hot mills. Currently, they are said to prefer means other than punched card input for mill programing. But the input method being considered was not identified.

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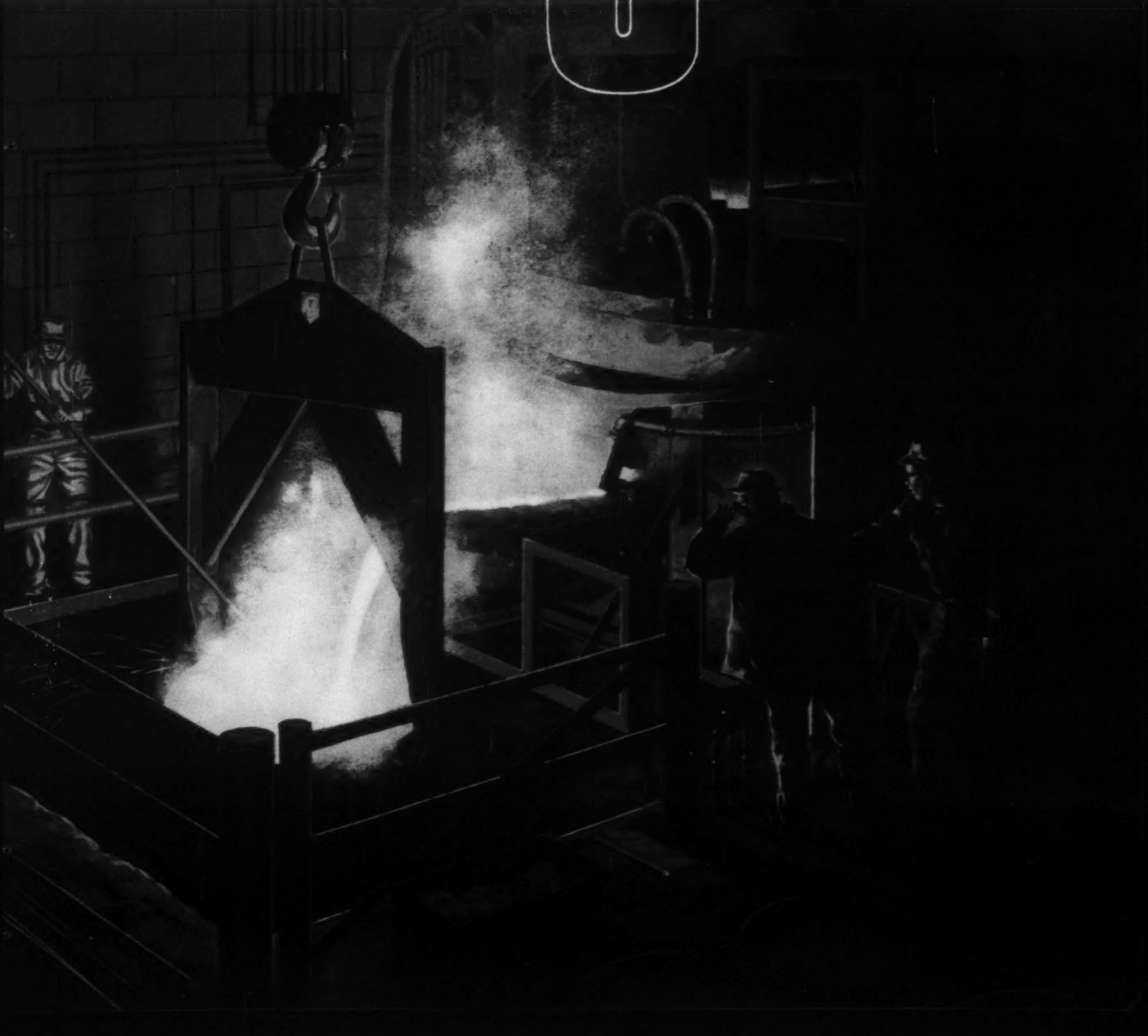

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"No one can afford the high cost of corrosion," says Dick. "That's one reason Du Pont Paints are so often specified. Take, for example, our popular Tank White Enamel. Its lasting whiteness and high reflectivity have meant substantial savings in the petroleum industry by reducing evaporation losses. Its durability is outstanding, too. On one tank in a large refinery, this tough finish lasted more than *20 years* . . . despite exposure to HF and SO_2 fumes, water spray and weathering.

"But quality paints are only part of the story when you specify Du Pont. Just as important, from the standpoint of long-term savings, is technical assistance in applying them. You see, we base our recommendations on a first-hand analysis of your particular maintenance needs. Result: protection that's tailored to the conditions in your plant—*at lowest cost per square foot per year*."

You'll find a man like Dick Durham working out of the Du Pont district sales office nearest you. Why not take advantage of his training and experience? For complete information on how to beat your *own* corrosion problems, give him a call. Or write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. S-69, Wilmington 98, Delaware.

* * *

With the Du Pont Finishes Division since 1933, Richard D. Durham is headquartered in his native Birmingham, Alabama. A corrosion specialist, he has helped find the answer to maintenance problems for the paper, textile, chemical, petroleum and steel industries throughout his territory. At home, he's a member of the Birmingham Paint Club and the Birmingham Sales Executives Club.

DU PONT PAINTS

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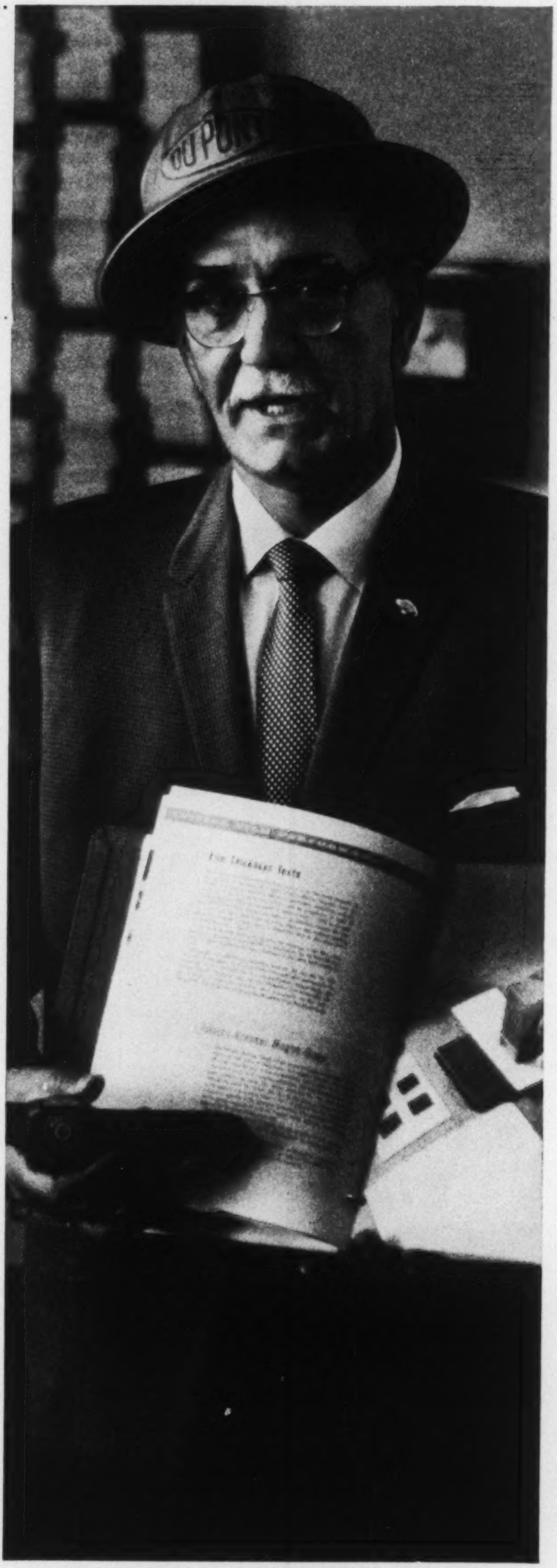
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



1960 AISE CONVENTION

PROGRAM

Iron & Steel Exposition Sept. 27-30, Cleveland

The exposition and all technical sessions will be held at Cleveland Public Auditorium. Exhibit hours will be 10 a.m. to 10 p.m. on Sept. 27 and 28, 10 a.m. to 5 p.m. on Sept. 29, and 10 a.m. to 4 p.m. on Sept. 30.

TUESDAY, SEPT. 27—9:30 A.M.

COMBUSTION SESSION

(Ballroom)

Chairmen: Edward W. Fitch, Republic Steel Corp. (Youngstown) and Stephen Vajda, Jones & Laughlin Steel Corp., Pittsburgh.

Techniques in Rebuilding Open Hearth Furnaces — Carl F. Bessent, Bethlehem Steel Co. (Sparrows Point, Md.).

Evaluation of Checker Design—F. D. Nelson, Inland Steel Co. (East Chicago, Ind.).

A Comprehensive Method for the Thermal Design of Regenerators—J. W. Hlinka, F. Puhr, and Dr. V. Paschkis, Columbia University, New York.

LUBRICATION SESSION

(Clubroom B)

Chairmen: Norman A. Bracht, Alan Wood Steel Co., Conshohocken, Pa., and Robert L. Humphreys, Bethlehem Steel Co. (Sparrows Point, Md.).

Test Stand Evaluation of Oil Film Roll Neck Bearings—Norman A. Wilson, and Samuel S. Rickley, Morgan Construction Co., Worcester, Mass.

Grease on Tap—Charles A. Bailey, National Tube Div., and Donald R. McCaa, American Bridge Div., United States Steel Corp., Pittsburgh.

Oil Mist Lubrication on Antifriction Backup Roll Bearings—C. W. Southerington, Dallas Div., Revere Copper & Brass Inc. (Chicago).

2 P.M.

OPERATING PRACTICE SESSION

(Ballroom)

Chairmen: A. B. Glossbrenner, Steel & Tube Div., Timken Roller Bearing Co., Canton, Ohio, and John H. Stone, Youngstown Sheet & Tube Co., Youngstown.

New Inspection Techniques and Their Effect on the Mill Operator—G. P. Michalos, Timken Roller Bearing Co., Canton, Ohio.

Analysis of Today's Tube Welding Processes — Norbert C. Rubin, Yoder Co., Cleveland.

Applying Clear, Mill Type, Pipe Coatings—Methods and Problems—Donald A. Golbey, Cleanola Co., Glenshaw, Pa.

MECHANICAL SESSION

(Clubroom B)

Chairmen: L. S. Mobley, Republic Steel Corp. (Gadsden, Ala.) and Walter Mainwaring Jr., Allegheny Ludlum Steel Corp. (Brackenridge, Pa.).

The Heating and Ventilating of a Modern Steel Mill Building—Charles H. Smith, L. J. Wing Mfg. Co., a division of Aero Supply Mfg. Co. Inc., Linden, N. J.

Gas Fired, Radiant Comfort Heating — J. N. Evans and V. J. Urschel, National Tube Div. (Lorain, Ohio) United States Steel Corp.

The Influence of Preloading by Sand Dunes on Economy of Foundations at the New Midwest Steel Mill—Elio D'Appolonia, E. D'Appolonia Associates, Pittsburgh, and L. A. Fugassi, Midwest Steel Corp. (Valparaiso, Ind.), a division of National Steel Corp.

WEDNESDAY, SEPT. 28—9 A.M.

ELECTRICAL SESSION

(Clubroom B)

Chairmen: J. F. Kostelac, Crucible Steel Co. of America (Midland, Pa.), and Clayton L. Squier, Bethlehem Steel Co. (Lackawanna, N. Y.).

A Training Program for Key Electrical Maintenance Employees—Dr. Joseph S. Kopas, training counselor, Republic Steel Corp., and director, Human Engineering Institute, Cleveland.

Maintenance of Electric Power Equipment—John G. Roberts, Bethlehem Steel Co. (Lackawanna, N. Y.)

Safety for Steel Plant Electrical Men— J. F. Trenner, Bethlehem Steel Co. (Sparrows Point, Md.).

OPERATING PRACTICE SESSION

(Ballroom)

Chairmen: W. A. Black, Republic Steel Corp., Cleveland, and R. W. Holman, Tennessee Coal & Iron Div. (Fairfield, Ala.), United States Steel Corp.

Fundamentals of Heat Distribution and Refractory Wear in Electric Steel Furnaces—W. E. Schwabe, National Carbon Co. (Niagara Falls, N. Y.), division of Union Carbide Corp.

Production Aspects of the Dwight-Lloyd McWane Ironmaking Process—H. E. Rowen and C. D. Thompson, McDowell Co. Inc., Cleveland.

Use of the Open Coil Process to Change Composition and Produce Improved Sheet Steels—John A. Bauscher, Lee Wilson Engineering Co. Inc., Cleveland.

2 P.M.

COMBUSTION SESSION

(Ballroom)

Chairmen: Arthur S. Merrow, Bethlehem Steel Co. (Lackawanna, N. Y.) and F. S. Swaney, Jones & Laughlin Steel Corp., Pittsburgh.

Elimination of a Coke Plant Relief Holder—H. E. Taylor, Alan Wood Steel Co., Conshohocken, Pa.

Oxygen Steelmaking in the Ajax Furnace at the Appleby-Frodingham Steel Co.— Albert Jackson, technical director, Appleby-Frodingham Steel Co., Scunthorpe, and technical adviser on steelmaking, United Steel Companies Ltd., Sheffield, England.

Oxy-Fuel Processes Increase Steelmaking Rates—E. F. Kurzinski, and R. D. Jones, Air Products Inc., Allentown, Pa.

ROLLING MILL SESSION

(Clubroom B)

Chairmen: F. G. Kredel, Republic Steel Corp., Cleveland, and R. C. Schaefer, Wheeling Steel Corp. (Steubenville, Ohio).

Analytical Investigation of the Cold Rolling of Bar Stock—Dr. Alvin S. Weinstein, Dr. Carl F. Zorowski, and Frank J. Loss, Carnegie Institute of Technology, Pittsburgh.

New Automated Structural Rolling Facilities at South Works of United States Steel Corp., Chicago. — V. H. Lindberg and J. E. Duffy, United States Steel Corp. (Chicago).

Ceco's Ochiltree Works Modern Electric Furnace Bar and Merchant Mill—W. B. Jacobsen, Ceco Steel Products Corp., Lemont, Ill., and Lawrence S. Barker Jr., Rust Engineering Co., Birmingham.

THURSDAY, SEPT. 29—9 A.M.

ELECTRICAL SESSION

(Ballroom)

Chairmen: H. W. Dorset, Bethlehem Steel Co. (Sparrows Point, Md.) and J. A. Bruce Pinney, Alan Wood Steel Co., Conshohocken, Pa.

Electrochemistry in the Steel Industry— E. E. Vonada, Reliance Electric & Engineering Co., Cleveland.

New Concepts in Power Control Rooms for Steel Mill Drive Systems—V. E. Verheyden, General Electric Co. (Roanoke, Va.) and D. C. Nelson, Jones & Laughlin Steel Corp. (Aliquippa, Pa.).

Static Power Supplies for Ore Agglomeration—M. F. Corcoran, Allis-Chalmers Mfg. Co., Milwaukee.

(*Please turn to Page* 176)

(Concluded from Page 175)

COMBUSTION SESSION

(Clubroom B)

Chairmen: William M. Bloom, Allegheny Ludlum Steel Corp. (Brackenridge, Pa.) and Charles W. Dunn, Fairless Works (Fairless Hills, Pa.) United States Steel Corp.

5-Zone Reheat Furnace-South Works — George H. Krapf, South Works (Chicago), United States Steel Corp.

New Approach to Centralized Utility Dispatching at Fairless Works—F. W. Allen and L. Cizmadia, Fairless Works (Fairless Hills, Pa.) United States Steel Corp.

Waste Heat Boiler Applications at the Inland Steel Co.—W. M. Douglas, Indiana Harbor Works (East Chicago, Ind.) Inland Steel Co.

2 P.M.

LUBRICATION SESSION

(Clubroom B)

Chairmen: A. E. Cichelli, Bethlehem Steel Co., Bethlehem, Pa., and Robert J. Simes, Lukens Steel Co., Coatesville, Pa.

A Standardized Method for Rating Roller Bearing Load-Carrying Capacity—E. C. Denne Jr., SKF Industries Inc., Philadelphia.

Why Straight Cylindrical Bearings in the Steel Industry?—Philip H. Hutchinson, Hyatt Bearing Div. (Pittsburgh), General Motors Corp.

Life Dispersion of Antifriction Bearings—L. E. Root, Rollway Bearing Co. Inc., Syracuse, N. Y.

FOREIGN SESSION

(Ballroom)

Chairmen: Harry L. Jenter, American Steel & Wire Div. (Cleveland) United States Steel Corp., and Emil Kern, Allegheny Ludlum Steel Corp., Pittsburgh.

Observations of the Steel Industry in India and Japan—John L. Young, United States Steel Corp., Pittsburgh.

Steel Production in Latin American Countries—Gen. Edmundo de Macedo Soares e Silva, Companhia Siderurgica Paulista-Cosipa, Sao Paulo, Brazil, and president, Latin American Institute for Iron & Steel, Santiago, Chile.

Report on the Present Achievements and the Immediate Prospects of Development of Soviet Ferrous Metallurgy—Ivan Denisenko, Economic Research Institute, and Roman Belan, State Planning Commission, USSR.

FRIDAY, SEPT. 30—9 A.M.

ELECTRICAL SESSION

(Ballroom)

Chairmen: John A. Drgon, Edgar Thomson Works (Braddock, Pa.), United States Steel Corp., and Richard G. Nolan, Granite City Steel Co., Granite City, Ill.

Computers for Industrial Control—R. W. Sonnenfeldt, Radio Corp. of America, Natick, Mass.

Analog and Digital Techniques Used in Rolling Mill Electrical Systems Design—D. E. Abell, Westinghouse Electric Corp. (Buffalo).

Application of Digital Computers for Accounting and Control of Continuous Processing Lines—R. W. Kirkland, General Electric Co., Schenectady, N. Y.

OPERATING PRACTICE SESSION

(Clubroom B)

Chairmen: William O. Bishop, Indiana Harbor Works (East Chicago, Ind) Inland Steel Co., and Thomas L. Nabors, Republic Steel Corp. (Gadsden, Ala.).

Pressure Drop Regulation Closes the Blast Furnace Control Loop—Otto J. Leone, consulting engineer, West Newton, Pa.

Limitations of Blast Furnace Stoves—T. R. Schuerger and Dr. J. C. Agarwal, Applied Research Laboratory (Monroeville, Pa.) United States Steel Corp.

The Use of Natural Gas in Blast Furnaces at the Pueblo Plant of the CF&I Corp.—John M. Negomir, Pueblo Plant, Colorado Fuel & Iron Corp., Pueblo, Colo.

2 P.M.

OPERATING PRACTICE SESSION

(Ballroom)

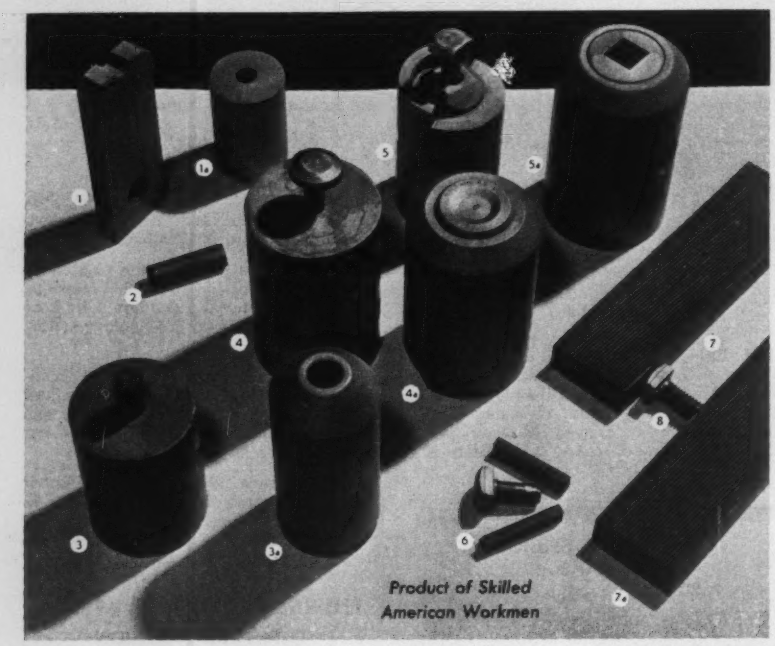
Chairmen: F. F. Argust, Colorado Fuel & Iron Corp., Pueblo, Colo., and Clyde A. Roberts Jr., Phoenix Steel Corp., Phoenixville, Pa.

The Next Step in Steel Plant Data Processing—W. N. Spray, United States Steel Corp., Pittsburgh.

Minimizing Pollution from Pickling Lines: Automatic Control of Strip Pickling Bath Composition—C. W. Shingledecker, Bethlehem Steel Co., Bethlehem, Pa.

Steps Toward Coke Plant Automation—N. F. Agnew, Femco Inc., Irwin, Pa.

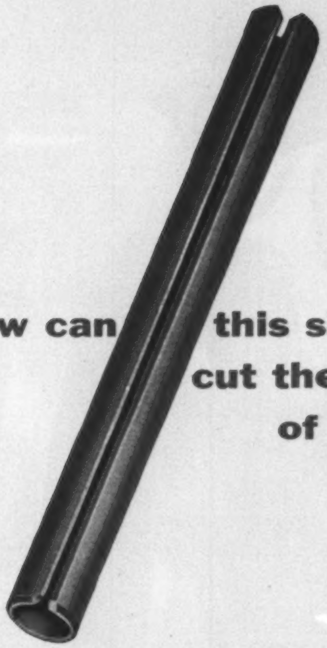
COLUMBIA
TOOL
STEELS



TOOL STEELS IN USE: Tooling for fully automatic cold heading of bolts.

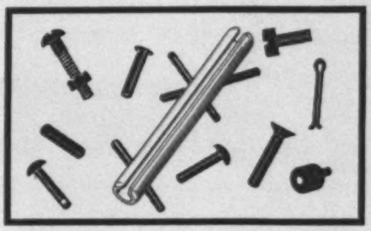
1 — Cut-off blade COLUMBIA EXTRA carbon tool steel
1a — Cutter plug COLUMBIA EXTRA HEADERDIE
2 — Bolt blank as cut off ready for heading
3 — First station die COLUMBIA EXTRA HEADERDIE body with MOLITE HW10 insert
3a — First station upsetter COLUMBIA EXTRA HEADERDIE
4 — Second station die COLUMBIA EXTRA HEADERDIE body with MOLITE HW10 insert
4a — Second station hammer COLUMBIA EXTRA HEADERDIE body with MOLITE HW10 insert
5 — Trim punch E-Z-DIE air hardening steel
5a — Trim die COLUMBIA EXTRA HEADERDIE with low carbon 18-4-1 high speed steel insert
6 — Pointers MAXITE super high speed steel
7 & 7a — Roll thread dies ATMODIE air hardening high carbon high chromium steel
8 — Finished Bolt

COLUMBIA TOOL STEEL COMPANY
410 Lincoln Highway
Chicago Heights, Illinois



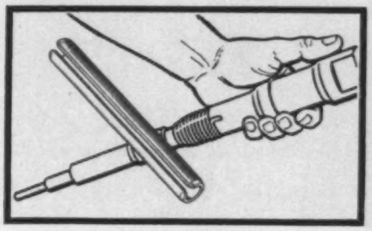
How can this simple fastener cut the cost of your product?

Rollpin aids standardization and reduces inventory



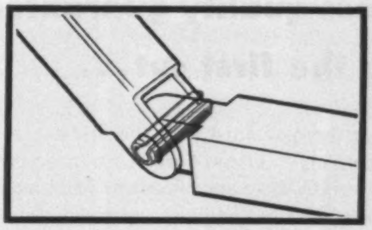
Rollpin readily replaces taper pins, grooved pins, straight pins and set screws; it can be used as a locating dowel, hinge pin, cotter pin, stop pin or, in some applications, even as a rivet. Thus, when you standardize on a Rollpin you can drastically reduce the variety of fasteners in your inventory—save money in purchasing, storage space and stock handling.

Rollpin simplifies production processing . . . saves man-hours



When you use Rollpin you can eliminate costly precision drilling, or tapping operations. And there's no need for any secondary locking operation—such as lock wiring or peening. That's because Rollpin is a slotted tubular steel spring whose chamfered ends drive easily into standard production-drilled holes, compressing as driven. The spring tension against the hole walls retains Rollpins securely against severe vibration. Independent studies have shown that installed costs of Rollpin are as much as *91% less* than those for a dowel pin or *95% less* than the installed cost of a taper pin.

Rollpin simplifies product maintenance



Only a drift pin or standard punch is required to remove a Rollpin. The slotted tubular shape and the spring action principle do not damage hole walls or enlarge the original hole diameter. Consequently the same pin is easily re-inserted and can be used again and again. Mail our coupon today for the complete Rollpin story.

ROLLPIN®

a product of

Elastic Stop Nut Corporation of America

Dept. R58-960, Elastic Stop Nut
Corporation of America
2330 Vauxhall Road
Union, New Jersey

Please send the following free fastening information

- ☐ **Rollpin bulletin**
- ☐ **ELASTIC STOP® nut bulletin**
- ☐ **Here is a sketch of a fastening problem. What ESNA® fastener would you recommend?**

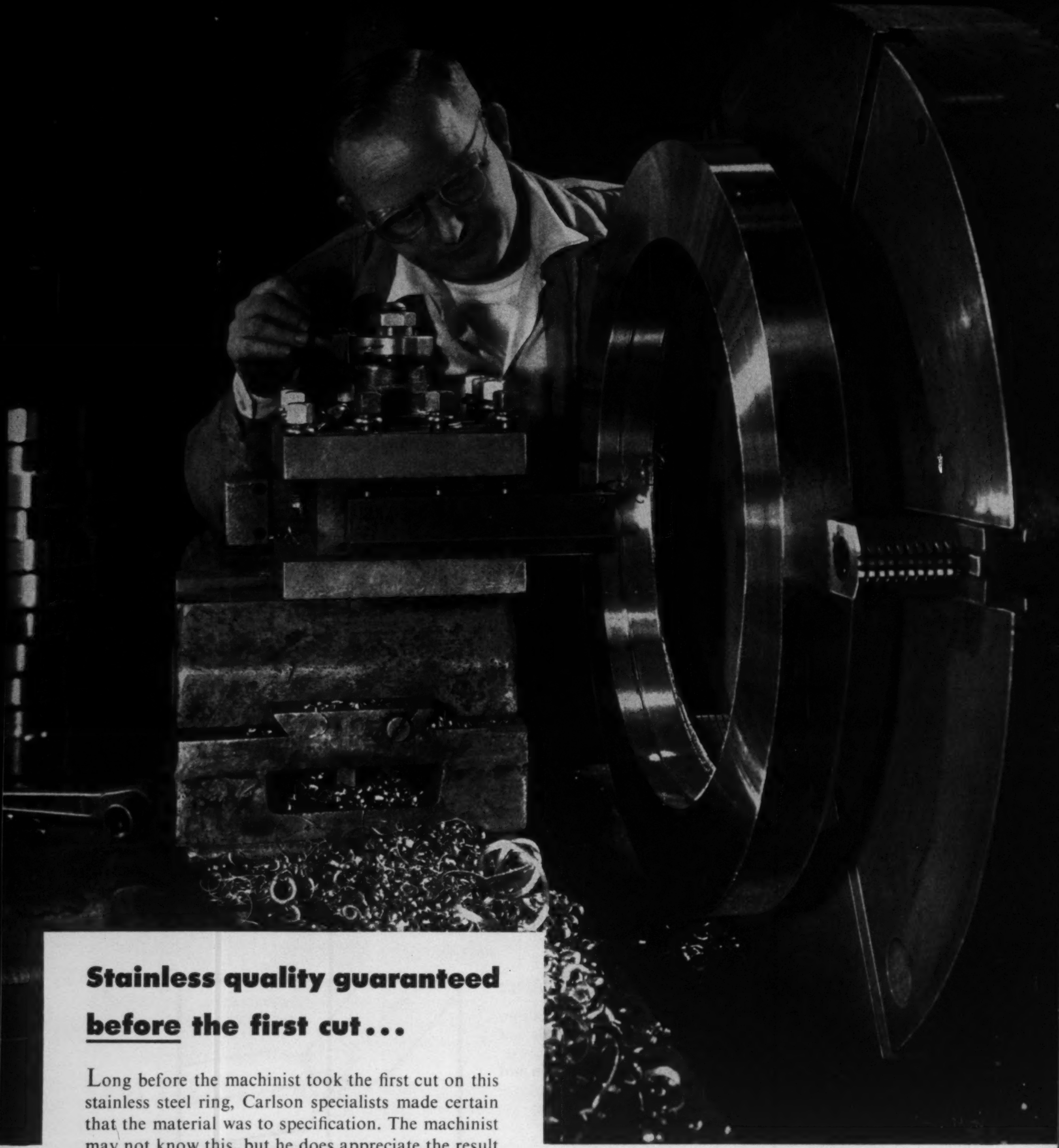
Name____________________

Title____________________

Firm____________________

Street____________________

City________ **Zone**____ **State**______



Stainless quality guaranteed before the first cut...

Long before the machinist took the first cut on this stainless steel ring, Carlson specialists made certain that the material was to specification. The machinist may not know this, but he does appreciate the result—the ease of machining to meet the most exacting requirements.

Whether you want rectangular stainless plates, pattern-cut special shapes, or machined products, you will save fabricating time by making full use of Carlson services. Fabricators of chemical, process, nuclear, aircraft and missile equipment recognize the advantages of these services.

Our specialists will be glad to work with you in producing just what you want, delivered on time. Telephone, write or wire for action.

G.O.CARLSON *Inc.*

Producers of Stainless Steel

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THORNDALE, PENNSYLVANIA
District Sales Offices in Principal Cities

Plates • Plate Products • Heads • Rings • Circles • Flanges • Forgings • Bars and Sheets (No. 1 Finish)

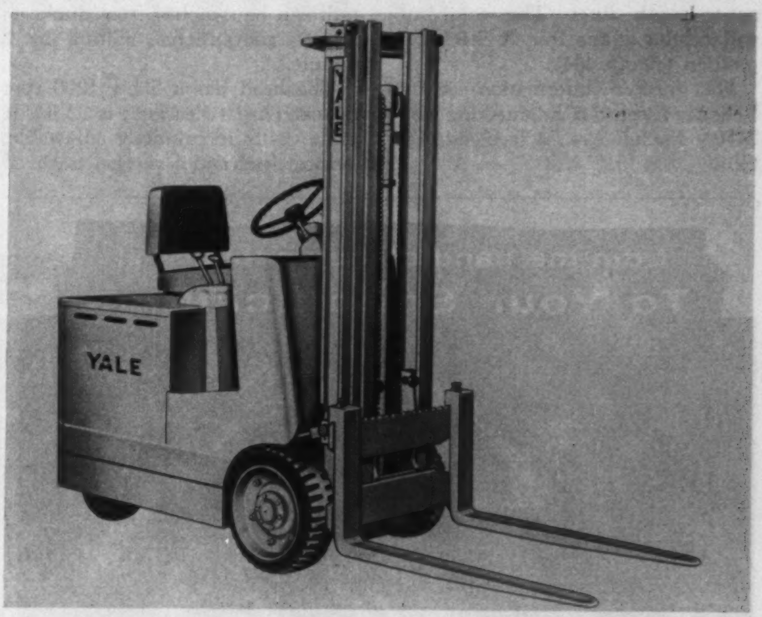
Electric Truck Lifts Load at 95 ft per Minute

THIS electric lift truck is compact and low. Lift speeds are 150 ft per minute (empty) and 95 ft per minute (fully loaded). It's equipped with Yale's mechanically actuated, Carbon Pile, speed control. Capacities: 2000, 2500, and 3000 lb.

Also offered is a gasoline (or LP-gas) powered lift truck (G-54). It has an automatic, constant mesh, torque transmission; a dual brake-inching pedal; and high visibility, nested mast design. It's designed to hold down maintenance costs. Capacities: 3000, 4000, and 5000 lb.

The company is also introducing the link chain version of the portable, Midget King, electric hoist. The company will exhibit at the Iron & Steel Exposition (Booth 494).

For further information, *write* Yale Materials Handling Div., Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.



Digital Controlled Drive Systems in Modular Units

MODULAR construction, built-in test equipment, and full system responsibility are featured in digital controlled drives made by Reliance. The company says the highly accurate systems are not affected by component drift.

On cut-to-length lines, the systems can cut precisely to any desired length calibrated in increments as fine as 1/64 in. The units are designed for operation on the plant floor without air conditioning.

The units have printed circuit boards. Complete circuits are embedded in solid blocks of resilient plastic. Complicated test procedures are not required. Accessible test fixtures permit easy checkout of circuits and plug-in modules are easy to replace.

Reliance channel wiring is used throughout, except in sensitive circuitry. Power and signal leads are carried in separate channels to prevent interference. Flexible wiring,

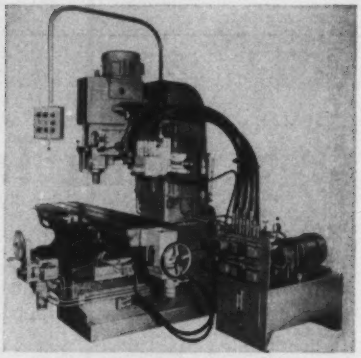
RELIANCE
RELIANCE

connected without bends, prevents vibration damage and lengthens equipment life. Typical applications for the equipment include classifier lines, test stands, press feeders, and cut-to-length lines. The company will exhibit at the Iron & Steel Exposition (Booth 444).

For further information, *write* Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.

Switch from Duplicating To Milling Takes 1 Minute

A VERTICAL milling machine (Visi-trol Model 3½) has three dimensional, hydraulic duplicating controls. The company says the unit can be switched from duplicating to conventional milling in 1 minute.



The head has a 5 hp, 1200 rpm motor. Throat clearance is 22 in. It comes with an infinitely adjustable, vertical feed and a vertical travel of 16 in. The machine has a 16 x 66 in. table with slots. It has tracer feed and manual rapid feed control. With the head up, height is 102 in. It's 92 in. wide with the table in center position.

For further information, *write* Visi-trol Engineering Co., 12720 Burt Rd., Detroit 23, Mich.

from the hand of the specialist . . .
To Your Specifications

ERIE Bolts • Studs • Cap Screws • Nuts
In Alloys • Stainless • Carbon • Bronze

Designers and engineers from every field of industry submit their exacting specifications to us for special fasteners to resist corrosion, extremes of temperature, tensile, fatigue, impact, and shear stresses. For more than 40 years our skilled craftsmen have met the requirements of construction and farm machinery, of transportation, refining and railroad equipment, the heavy machines of industry, pressure vessels, compressors, pumps, in widely diverse applications. We are prepared to serve you well. Send us your fastener specifications for prompt estimate.

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Reducers Meet Drive Needs In Low Power Range

RATINGS in the 1/6 to ¾ hp input range are provided by the Model 221 Optimount, helical gear, speed reducer.

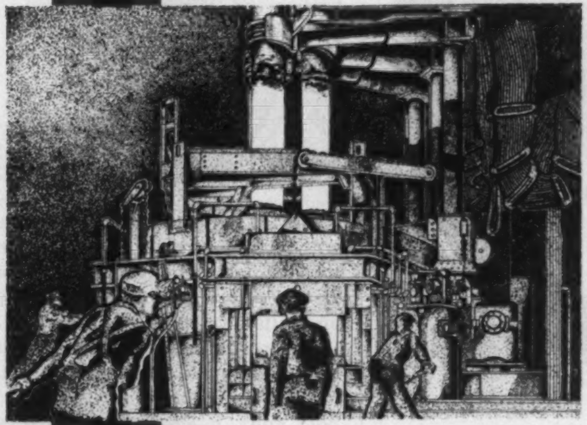
It's available horizontal and vertical base mounted or shaft mounted for immediate installation.

For further information, *write* Boston Gear Works, Quincy 71, Mass.

Company Offers Low Cost Airless Spray Unit

AN ECONOMICAL airless spray outfit is suited for jobs where accessories, portable base, and air lift are not extensively used. The unit uses the same pumping unit as other DeVilbiss airless equipment and the same spray gun. It in-

AN ELECTRODE'S HIDDEN VALUES EXCEL IN REDUCING MELT-TON COSTS



One electrode looks much like another—yet one will do the job economically while another can be the cause of costly trouble. Efficient performance and reduction of down-time are directly related to an electrode's hidden values.

These values grow out of unceasing research that leads to steady product improvement—out of the unwavering control of quality—and out of customer service that renders immediate assistance in overcoming abnormal operating problems.

Such hidden values find further expression in the substantial inventories maintained for customer convenience—in the rapidity of shipment and delivery—and in the integrity of the maker in providing products that can be fully trusted.

These are the values you get in full measure—in addition to the intrinsic merit of the product—when you specify GLC electrodes.

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keeping
water
OUT
or keeping water
IN?
Townsend Tuff Tites®
do both jobs
well . . .

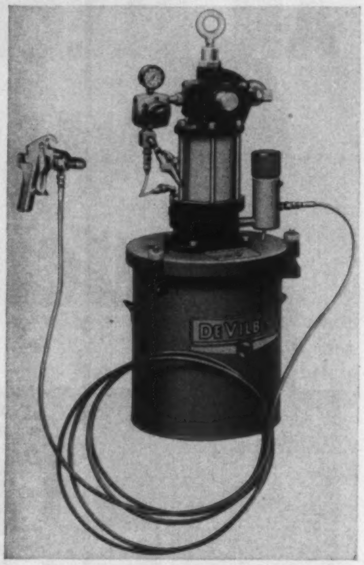
One of the outstanding advantages of Townsend Tuff Tite fasteners is that they provide an economical means for leakproof joining of metal, asbestos, porcelain or plastic. The pre-assembled conical neoprene washers flow into the holes as the fasteners are seated, filling them and making waterproof seals. Tuff Tites are effective for any application requiring leakproof joints, such as those needed in the construction or appliance industries.

Tuff Tite advantages include ease and economy of installation, surface protection and vibration resistance. Standard items are immediately available from jobbers and warehouses. Tuff Tites are also available in numerous special designs to suit any application need.

If you are joining metal, plastic, porcelain or asbestos, you should know about Townsend Tuff Tites. Ask your Townsend representative, or we will send you complete literature. Townsend Company, Engineered Fasteners Division, P.O. Box 71-C, Ellwood City, Pa.

UNDERCUT IN WASHER-HEAD CONTROLS FLOW
CONICAL SHAPE IS SECRET OF GOOD FLOW

Townsend Company
ESTABLISHED 1816
Engineered Fasteners Division
ELLWOOD CITY • PENNSYLVANIA
Cherry Rivet Division • Santa Ana, California
In Canada: Parmenter & Bulloch Manufacturing Company, Limited, Gananoque, Ontario



cludes a refillable, 10 gallon tank with clamp lock lid, pressure control regulator and gage, air-motor-driven agitator, filter, and positive air shutoff valve.

Other additions to the DeVilbiss line include an airless gun for automatic application, two models of pole guns, a small capacity spray cap, and swivel connections (high pressure type) to permit free gun rotation. The automatic airless gun can handle all airless type spraying materials.

For further information, *write* DeVilbiss Co., 296 Phillips Ave., Toledo 1, Ohio.

Magnetic Particles Aid In Showing Up Flaws

A MAGNETIC particle inspection system (Recordaflux) detects defective welds, cracks, inclusions, and other flaws.

Special solutions containing magnetic particles set up as strippable plastic film when sprayed or poured on the surface of a part. The magnetic particles show the shape and size of a weld and make it easy to detect a defective joint.

The patterns may be viewed on the part and washed away or they may be stripped, viewed, and filed for reference. The films can be reproduced.

Other applications: Magnetic field studies, and the determination of grain direction in sheet metal and sectional forgings.

For further information, *write* Instruments Div., Budd Co., Box 245, Phoenixville, Pa.

Oven Handles 'Close' Work

OVENS with a range up to 1000° F have automatic heat control (±½° F). They're suitable for Teflon fusing or sintering, aluminum treating, glass annealing, and other processing requiring close temperature control.

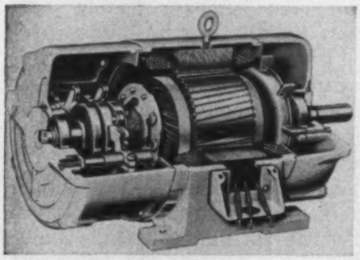
Either gas or electric models are available. The units are equipped with indicating type automatic controls and have uniform, high velocity air flow through the work chamber. Six models (13 x 13 x 13 in. to 48 x 42 x 30 in.) are standard. Small models come equipped with swing doors. Counterweighted, vertical lift doors are used on the large units.

For further information, *write* Despatch Oven Co., 619 S. E. Eighth St., Minneapolis, Minn.

Redesigned Motors Are Lighter, Smaller

REDESIGNED wound rotor motors made by Louis Allis Co. meet NEMA standards in frame sizes 213 to 326 U. They feature: Reductions in size and weight; improved secondary characteristics to reduce control and installation costs; low rotor inertia design for greater response; strong collector and brush assemblies; and an insulation system that resists oil, dirt, weak acids, and abrasive dust.

The motors are suited for elevators, cranes, hoists, and similar applications. Open, dripproof, or totally enclosed, nonventilated en-



Far Ahead in Design and Efficiency

"YOUNGSTOWN"

CONTOUR ROLL LATHES

(Capacities 24" - 36" - 48" - 60" - 72")

Automatic

"templet or numerically controlled" hydraulic or electric tracers assure fine finish and precision operation

Designed for a single purpose—roll turning. Choice of turning rolls in housings on the roll necks or using the heavy duty live centers provided in the headstock and tailstock.

"YOUNGSTOWN" engineering anticipates your future, as well as present productive position, in this quality line of Contour Roll Lathes.

PROVEN PERFORMANCE FEATURES:

- Heavy Duty roll lathe *rigidity*—with the *versatility* of the engine lathe
- Use of carbide, or ceramic tools provided by wide RPM range of headstock speeds
- 3-way bed for rigidity, with hardened and replaceable wear plates
- Anti-Friction Ball screws and nuts for longitudinal travel of carriage and cross-slide insuring precision tracing
- Operator travels with the work
- Heavy-Duty spring-loaded tail stock with load indicator—safeguards bearings
- Headstock has illuminated inspection ports, automatic lubrication, Timken roller bearings
- Housings—manually or hydraulically operated
- Electric-Hydraulic Ragging attachment optional
- Heavy Duty mill type construction. Herringbone gearing throughout.
- Faceplate overhang eliminated.

Write us to arrange a demonstration.

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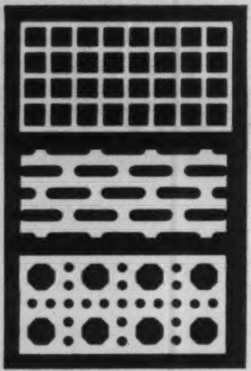
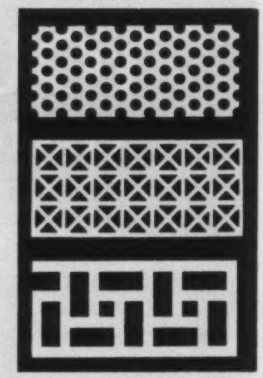
Serving Industry Since 1885

Youngstown 1, Ohio



THE
MONEY-SAVING
ANSWER
to
Many
Production
Problems

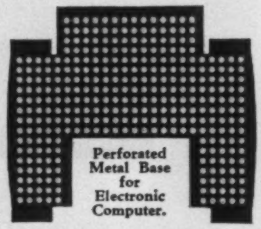


DIAMOND PERFORATED METAL

Sheets • Plates • Panels • Fabricated Parts

For nearly half a century we have supplied America's largest industrial organizations with perforated metal products of all kinds; in lots to meet their production schedules. This procedure not only reduces their inventory costs but, usually, also assures other substantial savings because of our special facilities for producing this type of work efficiently and economically.

Send us YOUR blue prints and specifications. Our experienced engineers are often able to make cost-cutting suggestions without charge or obligation.



Perforated Metal Base for Electronic Computer.

We fabricate special panels or parts to any desired extent. Illustrated Catalog on request.

DIAMOND MANUFACTURING CO., WYOMING (Wilkes-Barre Area) PENNA.

CONCO CRANE
ANNULAR
CRANE
CIRCULAR
CRANE

Your ideal source for custom-designed cranes—CONCO

This unique installation combines a 2-ton, 38'5" span circular crane and a 20-ton, 24'2" span annular crane, each with a 130' lift. One engineering problem solved: On the annular crane the outside wheels must travel at 195 FPM; the inside wheels at 125 FPM. Conco builds cranes for virtually every class of service, including specialized spark and explosion-proof cranes, two-hook cranes, and cranes employing closed-circuit TV remote control operation. A complete design service, including sample specifications, is available. Write us for bulletin 500B covering the Conco line of cranes, hoists and trolleys.

E.O.C.I. MEMBER

CRANES HOISTS CONCO

Material Handling Division
Conco Engineering Works, Inc., 70 14th Ave., Mendota, Ill.
AFFILIATES: Spartan Tool Division—Powered Sewer Cleaning Equipment
Field Control Division—Barometric Draft Controls
Conco Building Products, Inc.—Brick, Tile, Stone

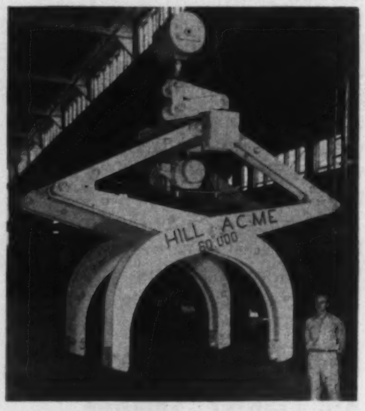
closures are available for horizontal, ceiling, or side wall mounting.

For further information, *write* Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis.

Motorized Lifter Eases Handling of Slabs

A MOTORIZED slab lifter permits an operator to position, lift, spot, and stack hot or cold slabs accurately without a floorman.

Box type construction aids in quick dissipation of heat.



High tensile alloy steel is used in all stress members. Single center hook or double sister hooks (for closer alignment) are optional.

For further information, *write* Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.

Pushbutton Line Has Many Interchangeable Parts

THREE pushbutton lines have been introduced by Clark Controller. Devices in each line include pushbutton units, selector switch units, standard pilot lights, and push to test pilot lights or lighted pushbuttons.

Type HO, oiltight units are convertible from base to panel mounting. Panel mounted applications include oiltight flush plates for operator's panels and benchboards. Base mounted units are used in oiltight, surface mounted enclosures.

Type H, NEMA 1, general purpose units are one hole (panel) mounted. (Base mounting units are also available.) They're suitable for flush plates, operator's panels, and benchboards.

Many parts can be interchanged among the three lines. Choice of seven American Standard safety colors for both buttons and ferrules permits double color coding. The series meets NEMA standards.

For further information, *write* Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio.

Boom on Truck Mounted Hoist Rotates 360 Degrees

TWO sizes (12,000 and 20,000 lb capacities) of the Silent Hoist, a truck mounted crane, are available. The crane revolves on a heavy duty ball bearing turret; boom rotation is 360 degrees. Provision is made for simultaneous, positive control of hoisting, topping, and telescoping.

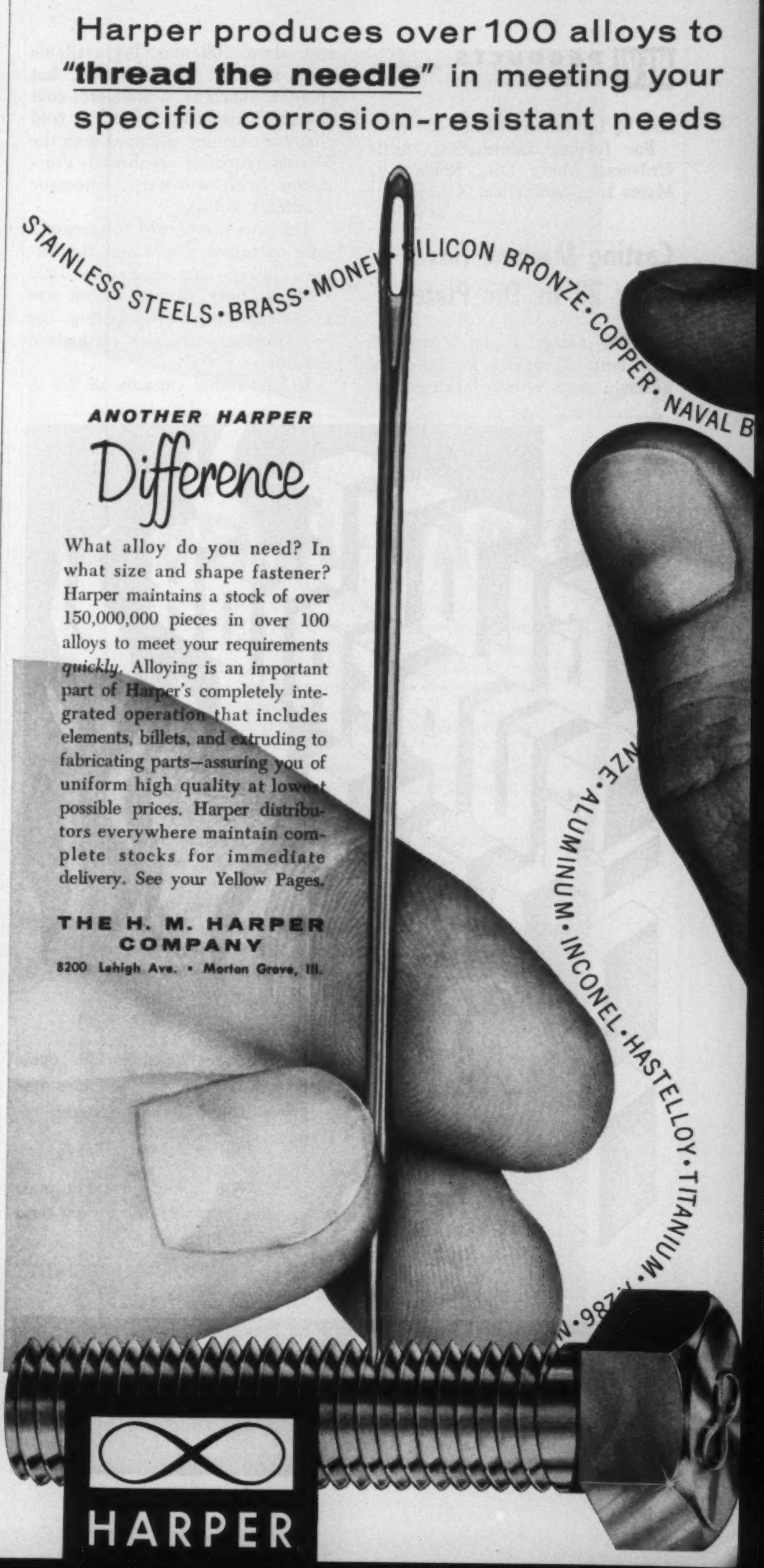
The boom is pivoted well forward on the chassis to provide a working reach of the entire boom length. The company will have an exhibit at the Iron & Steel Exposition in Booths 601 and 602.

For further information, *write* Silent Hoist & Crane Co. Inc., 841-877 63rd St., Brooklyn 20, N. Y.

Series Wound dc Motors Are Totally Enclosed

TWO models of series or shunt wound dc motors in Robbins & Myers Frame 29 are totally enclosed and nonventilated. Aluminum housings are diecast. The units are available for 6, 12, or 24 volt operation.

The units have typical ratings of 1/40 hp at 3000 rpm, 1/25 hp at 5000 rpm, 1/13 hp at 4150 rpm,



Harper produces over 100 alloys to **"thread the needle"** in meeting your specific corrosion-resistant needs

STAINLESS STEELS • BRASS • MONEL • SILICON BRONZE • COPPER • NAVAL B
NZE • ALUMINUM • INCONEL • HASTELLOY • TITANIUM • A-286 • N

ANOTHER HARPER
Difference

What alloy do you need? In what size and shape fastener? Harper maintains a stock of over 150,000,000 pieces in over 100 alloys to meet your requirements *quickly*. Alloying is an important part of Harper's completely integrated operation that includes elements, billets, and extruding to fabricating parts—assuring you of uniform high quality at lowest possible prices. Harper distributors everywhere maintain complete stocks for immediate delivery. See your Yellow Pages.

THE H. M. HARPER COMPANY
8200 Lehigh Ave. • Morton Grove, Ill.

HARPER

and ¼ hp (air over) at 6400 rpm.

For further information, *write* Universal Motor Div., Robbins & Myers Inc., Springfield, Ohio.

Casting Machine Has 22 x 23 in. Die Plates

A NEW design of the Model 100 Cleveland diecasting machine has a strain gage tested, locking pressure above 100 tons. It's available as a standard or automated, hot chamber machine; a standard, cold chamber machine; or as a cold chamber machine equipped with the Morton system of vacuum die evacuation (with or without automatic aluminum ladling).

The unit is equipped for accumulator operation of shot and die closing cylinders, and cycles over 1000 shots an hour (depending on size and complexity of the casting, the metal being cast, and method of operation).

It has a shot capacity of 2.6 lb for aluminum and 4.2 lb for zinc with standard plungers (other capacities with other size plungers). The machine has 22 x 23 in. die plates. Platens are 3¾ in. thick and tie bars are 2½ in. in diameter.

For further information, *write* Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio.

Welder Has Transformer Type Power Source

A BALANCED wave, transformer type power source has been designed for welding aluminum and magnesium. It uses alternating current. The Airco C-Bee Balanced Wave Heliwelder can be used with manual, semiautomatic, or automatic Heliweld equipment.

Features include capacitor balancing, high open circuit voltage for maximum arc stability, five broad overlapping ranges for applications requiring 20 to 400 amperes, and power factor correction.

The unit is rated at 300 amperes, 100 per cent duty cycle.

For further information, *write* Air Reduction Sales Co., a division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

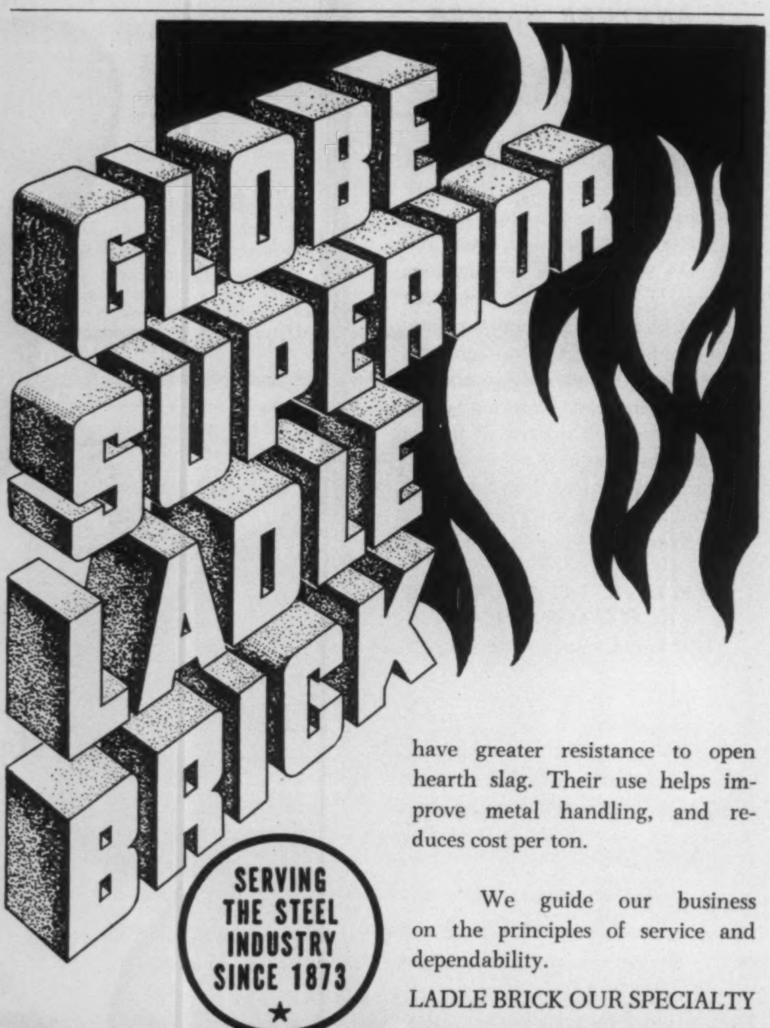
Ring, Circle, Slitting Shears Redesigned

POWER operated ring, circle, slitting shears, and flangers have improved speed and accuracy in circular cutting and flanging operations. The six machines in the line are designed for medium and heavy sheet metal work.

Three models of the ring and circle shears with capacities from 10 gage to ⅜ in. mild steel are available. They can cut circles 6 to 72 in. in diameter, starting on the inside or from the edge of square blanks.

Six models of circle shears have capacities of ⅛ through ¼ in. mild steel for cutting circles 10 to 58 in. in diameter, starting at the edge of square blanks.

Slitting shears (six models) are rated from ⅛ through ¼ in. mild steel. They handle sheets of any length and produce widths from ⅝ to 23 in.


GLOBE
SUPERIOR
LADLE
BRICK
SERVING THE STEEL INDUSTRY SINCE 1873

have greater resistance to open hearth slag. Their use helps improve metal handling, and reduces cost per ton.

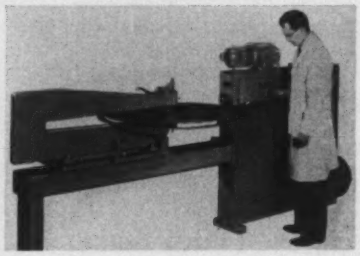
We guide our business on the principles of service and dependability.

LADLE BRICK OUR SPECIALTY

The GLOBE BRICK Co.
EAST LIVERPOOL, OHIO

Combination ring and circle shears and flanger cut discs 8 to 58 in. in diameter starting at the edge of square blanks (8 gage mild steel and 12 gage stainless). It can turn flanges up to 1½ in. high.

One combination circle shear and flanger cuts discs 5 to 48 in. in diameter from square blanks of 18 gage mild steel. The unit turns flanges up to 1 in. high and forms heads 10 to 48 in. in diameter inside flanges. Another unit cuts 17 to 80 in. diameter discs from ¼ in. square blanks (mild steel).



A flanger produces flanged heads 26 to 105 in. in diameter (inside flanges) from ⅜ in. mild steel plate. Heads up to 226 in. in diameter can be produced with a pin pivot.

For further information, *write* Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.

Elastic Coating Resists Gas Fumes and Smoke

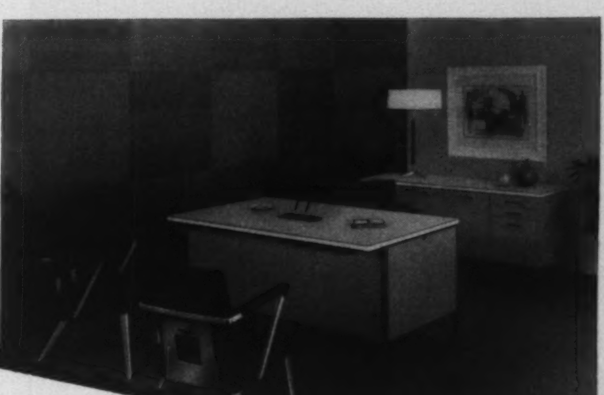
A BLACK, elastic coating (Everwear J-41-B) is impervious to water and is resistant to chemical attack by gas fumes and smoke. It can be used with minimum surface preparation. The company says the coating is anticorrosive above or below grade.

The material dries quickly. It can be brushed or sprayed on. It's packaged in 5 gallon pails and 55 gallon drums.

For further information, *write* Maintenance Inc., Wooster, Ohio.

Control Systems Designed For Small Machine Shops

ELECTROHYDRAULIC control systems developed by Minneapolis-Honeywell make it possible for small machine shops to use automation



General Fireproofing depends on...

FEDERAL-WARCO

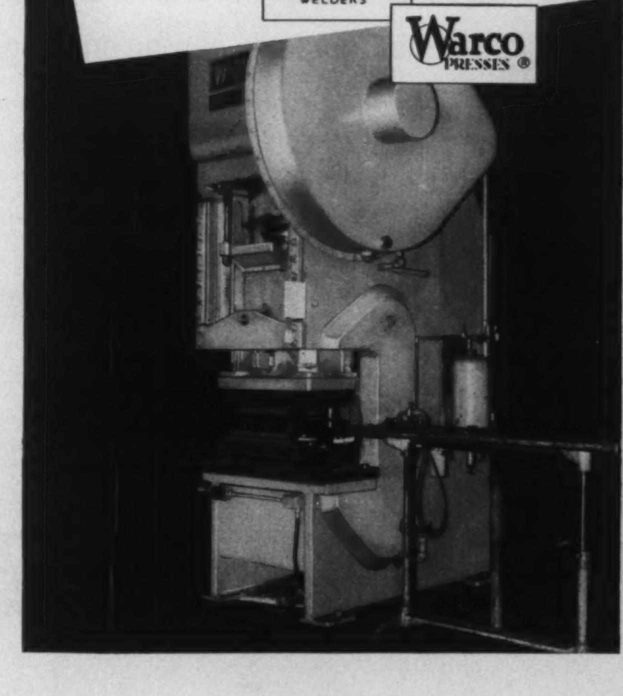
Warco presses and Federal welders operate as an integral part of General Fireproofing Company's production lines. They help General Fireproofing maintain its high quality standards and close tolerances, while meeting rigid production schedules.

The Warco press illustrated below, with related Federal-Warco equipment, helps General Fireproofing produce distinctive metal desks, filing cabinets, aluminum chairs, partitions and other products for the modern office.

THE FEDERAL MACHINE AND WELDER COMPANY
Warren, Ohio

Federal® WELDERS

Warco PRESSES ®



techniques. The units are described as "versatile." They require a minimum of setup time.

Each system can produce parts at accuracies of 0.001 in. Transistorized consoles utilize modular construction to simplify maintenance and to minimize downtime.

One setup is an absolute, point to point, numerical positioning and speed control system. It can handle any three axis machine used in turning, milling, punching, drilling, slotting, or routing operations.

A hydraulic press control allows the operator to automatically program the rate and position of the hydraulic ram from a console.

An automatic, two axis, 360 degree, tracer control permits any contour (including turning squares) to be machined automatically on an engine lathe without changing cutting tools.

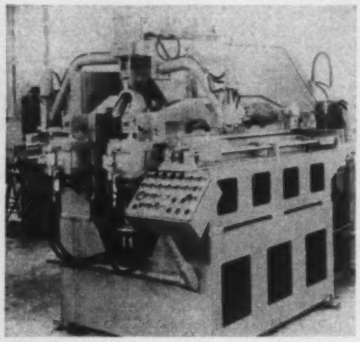
For further information, *write* Machine Controls Div., Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. S., Minneapolis 8, Minn.

Utility Strip Seamwelder Handles Galvanized Metal

DEVELOPED for steel mill processing lines, a utility strip seamwelder handles clean or galvanized metal up to 48 in. wide in 16 to 20 gage. The unit can weld at 30 fpm on clean stock. Power is provided by a 150 kva transformer.

Weld strength of 100 per cent of annealed parent metal is obtained by an end lap weld. You can adjust the lap up to 3/8 in.

Operation: The welder centers the presheared strip edges, gages the overlap, clamps leading and trailing edges, and welds. Pushbuttons control the automatic welding sequence. Weld rolls (mounted in a C frame) move across the work. Hinged retainers on the weld roll assembly provide quick dropoff for roll dressing.



Also developed by the same equipment maker is an automatic drumwelder that can produce containers ranging from the standard 100 lb drum to 55 gallon barrels.

For further information, *write* National Electric Welding Machines Co., 1846 Trumbull St., Bay City, Mich.

Electric Clutch Brake Prevents Tooling Damage

DAMAGE to tooling and parts can be prevented by an electric clutch brake available on Baird transfer presses (Models 2-19 and 3-25).

The clutch brake makes it possible to stop the machine in 1/2 revolution. The unit can easily be incorporated into electronic gaging and inspection

---

EXECUTIVE REPORT #5

DON'T SAVE PENNIES TO LOSE DOLLARS

the lowest-priced abrasive can be an expensive bargain

Your real concern is the *ultimate cost* of the blast cleaning abrasive you use, not its price per ton. Abrasive quality and performance controls your actual blast cleaning costs. Lower priced abrasives can cost you more, in excessive shot consumption, lower production volume, poor quality of work and excessive machine maintenance. In case after case, high quality Wheelabrator Steel Shot has proven to be the *lowest-cost* abrasive, all factors considered.

You can prove the savings you'll make with Wheelabrator Steel Shot

Your Wheelabrator Abrasive Engineer will demonstrate the performance of Wheelabrator Steel Shot in your own plant. For helpful suggestions to get better cleaning at lower cost, write for our new Handbook of Abrasive Performance. Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, P.O. Box 490, Scarborough, Ontario.

WHEELABRATOR
STEEL ABRASIVES

of parts during production runs. It allows an operator to run several machines simultaneously.

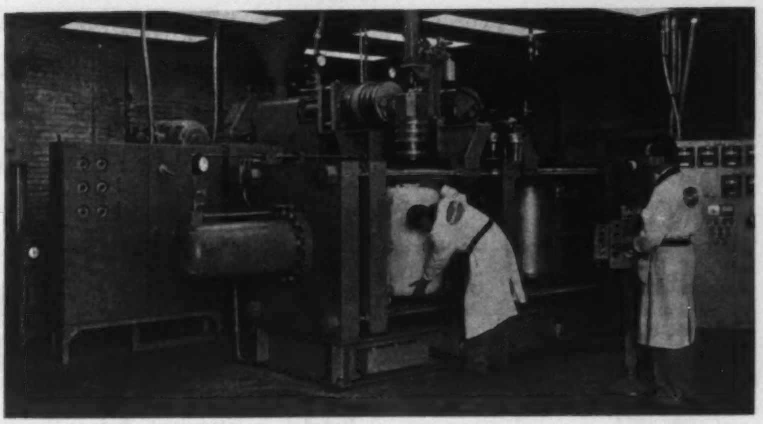
For further information, *write* Baird Machine Co., 1900 Stratford Ave., Stratford, Conn.

Numerical Control Unit Uses Eight Channel Code

THE Model 600 numerical control handles point to point positioning of machine elements. The absolute decimal digital control uses no binary or analog circuitry. All major electrical and electronic elements are plug-in types. Closed loop servo control (with final positioning always in the same direction) eliminates the effect of backlash in drive and control. The unit uses standard eight channel code.

Data input to position transducer is by means of lead screw or rack. A zero adjust transducer clutch can be supplied.

For further information, *write* Carlton Controls Corp., 15 Sagamore Rd., Worcester 5, Mass.



Drums Molded in 60 Seconds

THIS two stage, blow molding machine can produce 55 gallon drums having a 0.100 in. wall thickness within a 60 second cycle utilizing linear or high density polyethylene up to 0.96 density. Wall thickness is controlled.

Parts up to 50 lb can be produced.

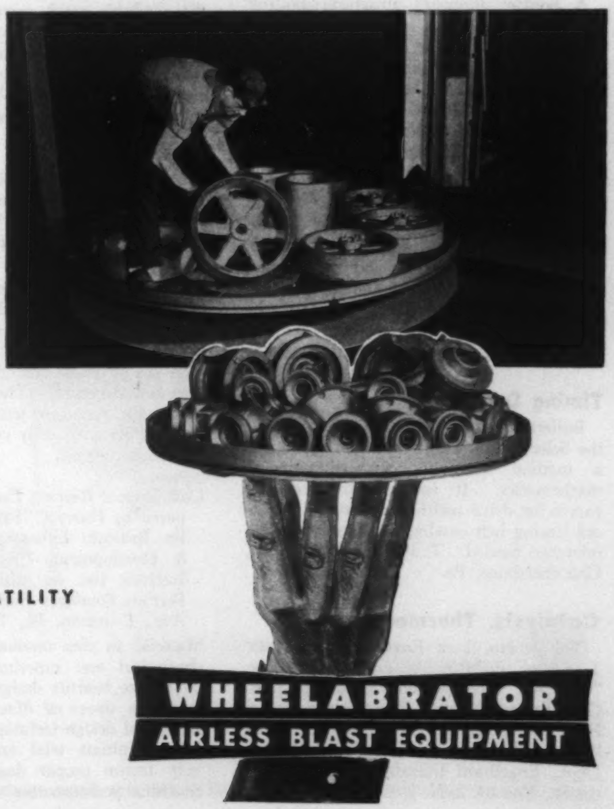
The platen area measures 50 x 50 in. Accumulator pressure is 100 tons and clamping pressure is 80 tons. Daylight opening is 54 in., and platen stroke is 30 in. Maximum molding size is 38 x 60 in. Floor space required (with accessories): About 1200 sq ft. One unit was made for Eclipse Plastic Industries Inc., Sarasota, Fla.

For further information, *write* Williams White Co., Moline, Ill.

EXECUTIVE REPORT #20

CASTINGS SERVED "WELL DONE"

On Wheelabrator® Swing Table®



Dodge Manufacturing Corp. of Mishawaka, Indiana, turned a production problem into profit by replacing outgrown airblast equipment with a Wheelabrator 96" Swing Table. The production power of this versatile blast cleaning cabinet cut labor requirements one third, and entirely eliminated overtime. Easy overhead loading and unloading speeds production, makes work handling highly efficient. The giant table takes mixed loads up to 10,000 lbs., and serves up cleaning quality far superior to anything previously obtained.

SWING TABLE OPTIONS COMPOUND ITS VERSATILITY

Wheelabrator Swing Tables can be equipped with double work doors, loading vestibules, spotblasting facilities, and other versatile features. For details, see your Wheelabrator engineer or write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

NEW Literature

Write directly to the company for a copy

Weight Calculator

A slide rule calculator aids in selection of strip steels. It's about 8 in. long and 3 in. wide. Markings are in the metric and U. S. in.-lb system for weight, length, width, thickness, and BWG. Uddeholm Co. of America Inc., 155 E. 44th St., New York, N. Y.

Graphite Cloth Data

Data on graphite woven fabrics and their applications are presented in a technical bulletin. It covers filament diameter, weave, count, gage, denier and ply, and permeability. Ask for Bulletin 101. National Carbon Co., a division of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

Metal Research

The Franklin Institute Laboratories have compiled a portfolio on their published studies in metallurgy, physics of metals, and other areas of metals research. Studies reprinted include purification of highly reactive metals; fine particle ferromagnetism; and zone refining of metals. Franklin Institute Laboratories for Research & Development, 20th & Franklin Parkway, Philadelphia 3, Pa.

Structural Bolting

A booklet discusses structural bolting and gives data on a high strength bearing bolt. Some of the advantages claimed for the bolt: Greater shear strength, high bearing values, and better grounding of the structure. United States Steel Supply Div., United States Steel Corp., 208 S. La Salle St., Chicago 90, Ill.

Nondestructive Testing

Three technical bulletins discuss the use of portable x-ray equipment in aircraft maintenance operations and in storage tank fabrication. Also presented is a listing of popular nondestructive testing methods and applications for each. Balteau Electric Corp., 5 New St., Stamford, Conn.

Timing Drive Selection

Bulletin 21103, "Five Simple Steps to the Selection of Timing Belt Drives" gives a method involving a minimum of mathematics. It includes five sets of curves for drive width selection. A standard timing belt catalog is the only outside reference needed. T. B. Wood's Sons Co., Chambersburg, Pa.

Catalysts, Thermocouples

Vol. I, No. 1 of Engelhard Industries' *Technical Bulletin* reports in detail on "Catalysts for Acetylenes Removal from Gas Streams" and "Developments on High Temperature Thermocouples Using Noble Metals." Technical Information Dept., Engelhard Industries Inc., 75 Austin St., Newark 2, N. J.

Electrode Data

A 20 page booklet on arcwelding electrodes covers specifications, chemical requirements, and methods of estimating electrode consumption. National Cylinder Gas Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.

NEW BOOKS

Report on Stress-Corrosion Cracking of Austenitic Chromium-Nickel Stainless Steel, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 96 pages (paper cover, 8½ x 11 in.), $6

Included is information from a survey covering 145 case histories from the U S. and England. Part 1 is a review of case histories. Part 2 covers present status of researchwork. The appendix includes tabulated data of the case histories and and annotated bibliography covering references up to June, 1959.

Literature Surveys on Influence of Stress Concentrations at Elevated Temperatures and the Effect of Nonsteady Load and Temperature Conditions on the Creep of Metals, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 108 pages, $4.50

The survey summarizes data on alloys under complex variations of load and temperature, and reviews several analytical procedures for calculating nonsteady behavior from steady state, stress tests. The survey on stress concentrations reviews the available notch rupture data to establish fundamental influences of stress concentrations, testing variables, and the influence of alloy compositions. Also included is a section dealing with the application of notch data to the problem of component design.

Progress in Nondestructive Testing, edited by E. G. Stanford and J. H. Fearon, MacMillan Co., 60 Fifth Ave., New York 11, N. Y. 250 pages, $12

This is the second of a series of volumes discussing nondestructive testing. It tells of progress made in relating the properties and materials to each other and to the structural factors which produce them. The six principal methods of flaw detection are surveyed. These are visual examination, penetrant testing, magnetic testing, radiography, eddy current testing, and ultrasonic testing.

Cast Bronze Bearing Design Manual, prepared by Harry C. Rippel of the Franklin Institute Laboratories for Research & Development, Cast Bronze Bearing Institute Inc. an affiliate of the Non-Ferrous Founders' Society, 1604 Chicago Ave., Evanston, Ill., 72 pages, $2

Material in this manual, which contains theoretical and experimental information on bronze bearing design, appeared serially in six issues of *Machine Design*. The simplified design techniques in the manual help eliminate trial and error methods, help insure proper design, and improve machine performance.

Spray Finishing (NFPA Standard No. 33), National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass., 44 pages, 50 cents

This revised edition includes new information on the storage and handling of organic peroxides which may be used in spray applications. Among other new provisions are requirements relating to piping systems containing flammable liquids for spray finishing operations. Several changes were made to clarify the intent of existing positions.

Data Sheets from Dust Collectors, British Steel Castings Research Association, E. Bank Road, Sheffield 2, England. 39 pages, $4.20

A series of data sheets gives up to date details on specific dust collectors suited primarily to steel foundry applications. The data sheets detail 32 dust collectors made by 19 organizations. An introduction contains comments on types, selection, location, and the approximate cost of dust collectors. A table of efficiency figures (for each type of collector) is included.

Welding Handbook, Section III, Miscellaneous Metal Joining & Cutting Processes, edited by Arthur L. Phillips, American Welding Society, 33 W. 39th St., New York 18, N. Y., 512 pages, $9

Special welding and metal joining processes, as well as arc and oxygen cutting processes are discussed. Chapters cover such things as forge, thermit, ultrasonic, and induction welding; surfacing; metallizing; brazing; soldering; welding of plastics; and studwelding (which was scheduled for Section II, but was held over to include techniques which were still in development). Subsequent sections will cover metals and applications of welding.

Fundamentals of Vacuum Heat Treating, Ipsen Industries Inc., 715 S. Main St., Rockford, Ill., 50 pages, $2

Heat treating furnaces and techniques of vacuum metallurgy are discussed. Annealing, hardening, tempering, sintering, and brazing under vacuum are detailed and examples are cited. Furnace design and construction are also covered.

Roll Pass Design, Publications Dept., United Steel Co. Ltd., P. O. Box 64, The Mount Broomhill, Sheffield 10, England, 280 pages, $9

Examples are cited to explain the methods used in designing rolls. Characteristics of hot rolling and roll quality and strength are discussed. The design of passes is covered by product groups.

Symposium on Radioisotopes in Metals Analysis and Testing, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 64 pages. $2.75

Subjects covered include nucleonics in analysis, instrumentation for nucleonics, metal analysis by radioactivation, principles of isotope dilution assays, and training industrial personnel in radioisotope utilization. The book is extensively illustrated.

"When you put in the Payroll Savings Plan... How did it affect company stock purchases by your employees?"

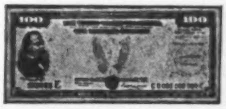
"Not a bit, Al! You see, quite a number of our people had never made any investment of any kind through regular deductions. When we put in the Payroll Savings Plan for U.S. Savings Bonds we gave many of them a brand new idea. Automatic saving!

"Our State Savings Bonds Director did a grand job of cooperating with us. He helped us organize a company-wide campaign that reached every man and woman on our payroll. It was explained to each employee—*personally*—that with just one signature on a card he could arrange to buy the new 3¾% Savings Bonds, *regularly*. We got a splendid response, and we found that our Company stock purchases increased, too!"

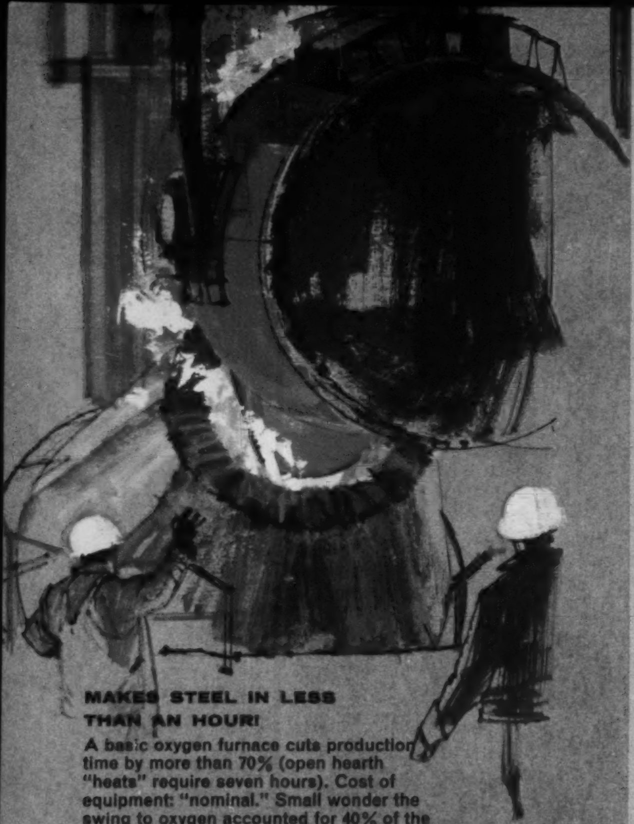
Leading American companies in every one of our 50 states find that substantial employee participation in the Payroll Savings Plan is a sound builder of esprit de corps. People like to feel that they *belong*—to their company group and to the group of millions of patriotic Americans who are contributing to our Nation's Peace Power. Contact your State Savings Bonds Director for prompt, understanding help in spreading Payroll Savings information, person-to-person.

NOW! U. S. SAVINGS BONDS EARN 3¾%

STEEL
The
Metalworking Weekly



THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.



DO YOU KNOW *the many places industrial gases can keep you ahead of competition?*

For example, here's what oxygen is doing for the steel industry alone: "BASIC OXYGEN PROCESS MAKES STEEL IN LESS THAN AN HOUR"; "OXYGEN CUTS PRODUCTION LABOR COSTS IN HALF"; "SLASHES COSTS OF STEEL-MAKING FACILITIES IN HALF." Each day, it seems, brings a new headline.

And the new applications come from all sides! New ways to use oxygen in smelting. New tricks in refining. New savings in tapping . . . cutting . . . welding . . . scarfing.

What next—for you?

One thing is certain: those who *do* keep up on industrial gas applications will keep a big step ahead of the competition. Three good ways: *first*, study your own operation for possible new applications of industrial gases; *second*, call on your Liquid Carbonic field representative to review these and other cost-cutting applications; *third*, watch for the new developments coming up.

You'll find them described in these pages as they develop—brought to you by Liquid Carbonic, *with the latest in industrial gas applications and distribution, from cylinders to large, on-site Liquidox* installations.*

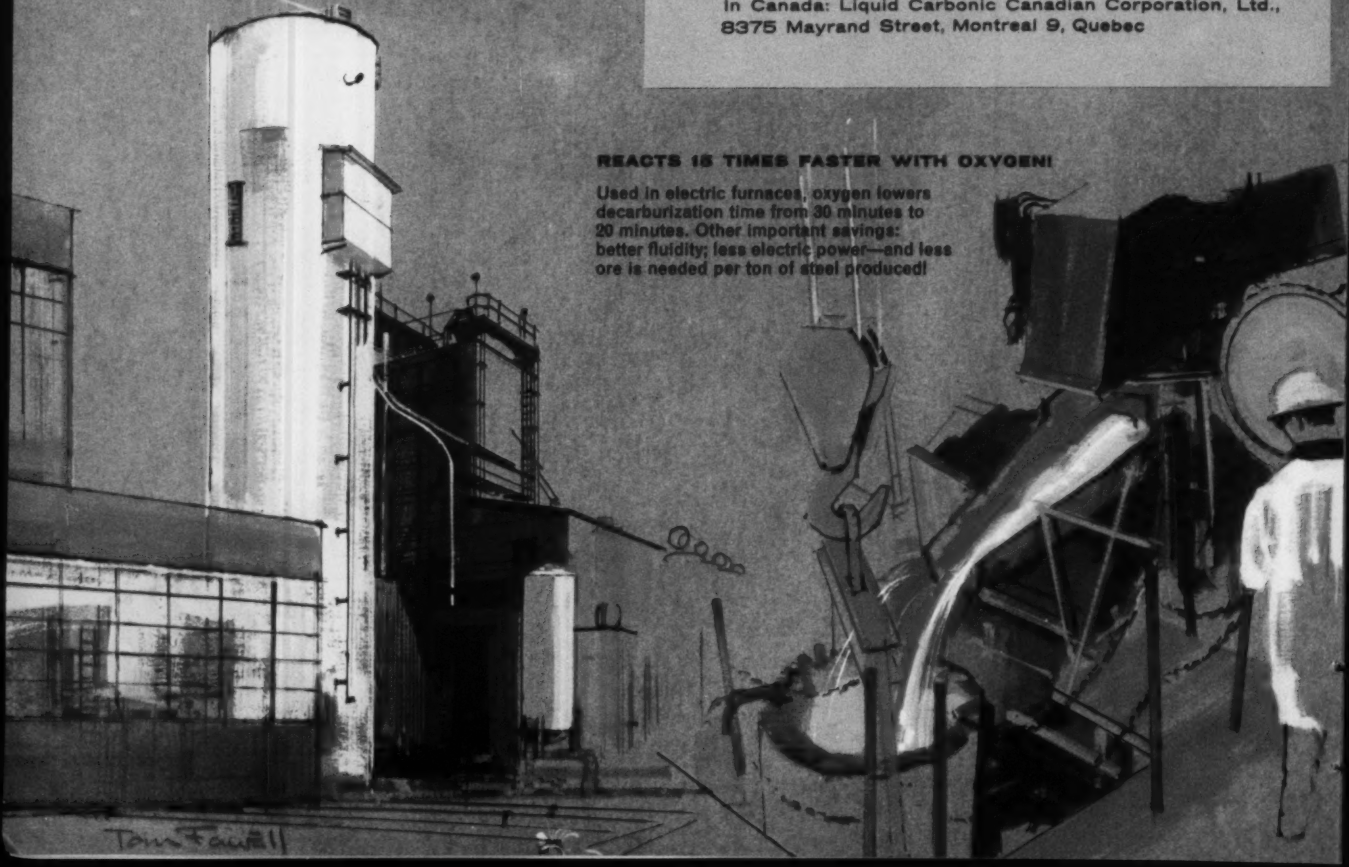
LIQUID CARBONIC
DIVISION OF **GENERAL DYNAMICS**
135 South LaSalle Street Chicago 3, Illinois
In Canada: Liquid Carbonic Canadian Corporation, Ltd.,
8375 Mayrand Street, Montreal 9, Quebec

MAKES STEEL IN LESS THAN AN HOUR!

A basic oxygen furnace cuts production time by more than 70% (open hearth "heats" require seven hours). Cost of equipment: "nominal." Small wonder the swing to oxygen accounted for 40% of the recent gains in U.S. steelmaking capacity!

ALL THE OXYGEN YOU WANT RIGHT NEXT DOOR!

With a Liquid Carbonic oxygen producing facility next to your steel plant, you are assured of all the oxygen you need. Here's a way to achieve all the advantages of an oxygen plant of your own without capital investment or operating responsibility. Contact your Liquid Carbonic representative for details.



REACTS 15 TIMES FASTER WITH OXYGEN!

Used in electric furnaces, oxygen lowers decarburization time from 30 minutes to 20 minutes. Other important savings: better fluidity; less electric power—and less ore is needed per ton of steel produced!

LIQUID CARBONIC
DIVISION OF **GENERAL DYNAMICS**
135 South LaSalle Street, Chicago 3, Illinois

Check through the following list of

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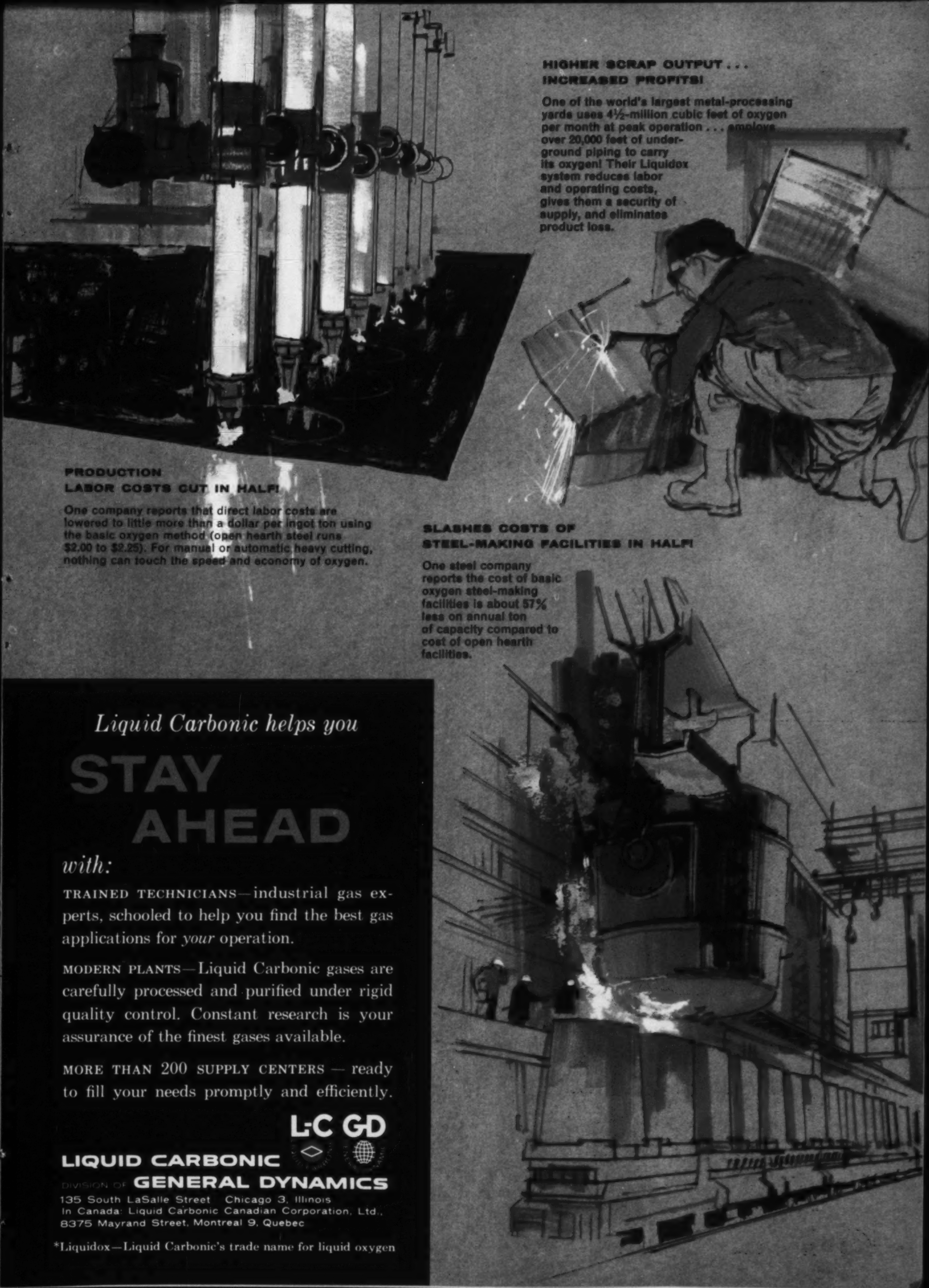

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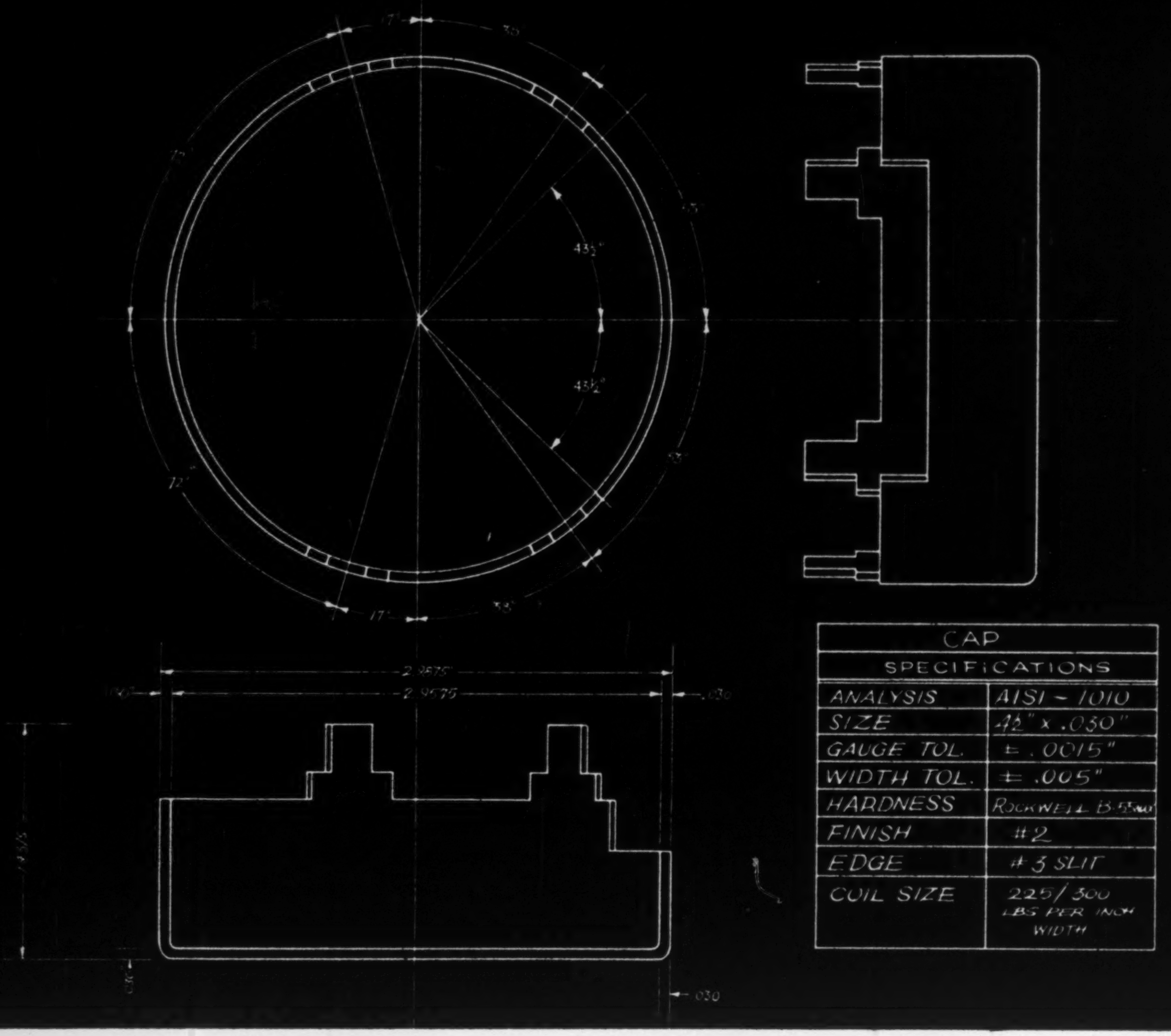

CAP SPECIFICATIONS	
ANALYSIS	AISI – 1010
SIZE	4½" x .030"
GAUGE TOL.	± .0015"
WIDTH TOL.	± .005"
HARDNESS	ROCKWELL B-55 MAX
FINISH	#2
EDGE	#3 SLIT
COIL SIZE	225/300 LBS PER INCH WIDTH

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Market Outlook

Uptrend in Steel Continues

WHILE it's difficult to detect a definite and sustained trend, finished steel buying appears on the upgrade. The pickup, while disappointing and primarily seasonal in character, is sufficiently robust to hold out the promise of steadily increasing activity in the steel industry the rest of this year. Orders have been on the rise for more than a month.

Avery C. Adams, chairman, Jones & Laughlin Steel Corp., says August's orders were 33 per cent above July's, and incoming September business shows a further gain of 10 per cent.

PRODUCTION RISES—Statistics for August bear out the increase in activity. Ingot output that month (6,836,000 net tons) was 485,076 tons better than the preceding month's, steelmaking operations averaged 54.2 per cent against 50.3 in July. In the first eight months this year, production was 73,941,019 net tons, with ingot operations averaging 74.4 per cent. In the like 1959 period, output was 70,949,656 tons.

The national ingot rate last week recovered 3.5 points to 52.7 per cent. During the Labor Day week, it slumped to 49.2 per cent. Output for the week was 1,503,000 tons vs. 1,401,000 the preceding week and 356,000 a year ago.

AUTO NEEDS—It's generally agreed the auto industry holds the key to activity in steel the rest of this year. The automakers are buying more actively than they were a few weeks back, but volume still falls short of seasonal expectations. While some carbuilders are taking in substantial tonnage, a number of them are reported holding sufficient inventory to support their operations well into the fourth quarter.

The simple fact is that automobile assemblies for the 1961 model runs are not accelerating as fast as had been hoped.

IMPACT OF COMPACTS— Also, it's thought that some indecision over steel requirements stems from uncertainties in production planning for compact and standard models. Until the percentage of compacts in the 1961 model runs is determined, it's thought that the automakers will hesitate to place firm specifications for all types and sizes of steel products they'll need.

ENCOURAGING FACTORS— Steelmakers are heartened by the increasing number of consumers placing production-size orders. (Recent buying has been essentially fill-in tonnage.) It's believed that users' stocks have been liquidated to the point where bigger volume acquisitions are necessary to support current manufacturing schedules. Steel service center order volume is also a little better. Distributors' steel inventories are down to around 3.4 million tons against 3.8 million two months ago.

PRODUCT AVAILABILITY—In some degree, the easy availability of steel shipments from the mills is a factor holding new buying in check. Consumers, assured of prompt deliveries, are inclined to rebuild stocks slowly, even where they are virtually depleted. Here's the delivery status of major steel products: Hot rolled sheets, two weeks; cold rolled sheets, three to five weeks; galvanized sheets, three to four weeks; silicon sheets, three to four weeks; enameling stock, three to four weeks; manufacturers' wire, one to five weeks; merchant wire, from stocks; sheared plates, ten days to two weeks; structural shapes, two to four weeks; carbon steel bars, two to four weeks; cold finished bars, from stock.

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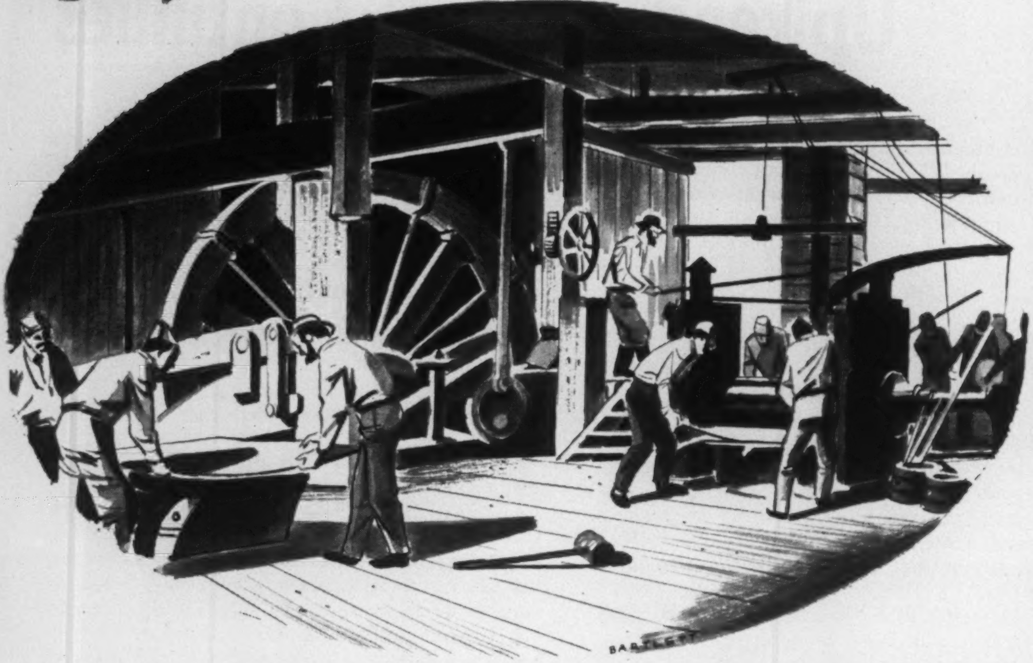
*Current prices were published in the Sept. 12 issue and will appear in subsequent issues.

AMERICAN ORIGINALS IN IRON AND STEEL



America's First Iron Plate Rolling Mill

Over one hundred and fifty years ago, the "Iron and Nail" factory that today is Lukens Steel Company was born on the banks of the Brandywine at Coatesville, Pennsylvania.

In that day, the production of plates was limited to less than 34 inches width in this water-driven mill. Today, Lukens Steel Company has the country's largest plate mill, producing rolled plates up to 195 inches in width.

Another famous first in the iron and steel industry is Baker's Magdolite, the original dead-burned dolomite. Ever since its early development, Magdolite has delivered more uniform ingots, in greater numbers and with less defective material. When you buy, be sure to specify Baker's Magdolite or Jebcolite. They are always 5 ways better . . . in composition, preparation, strength, economy and quality.

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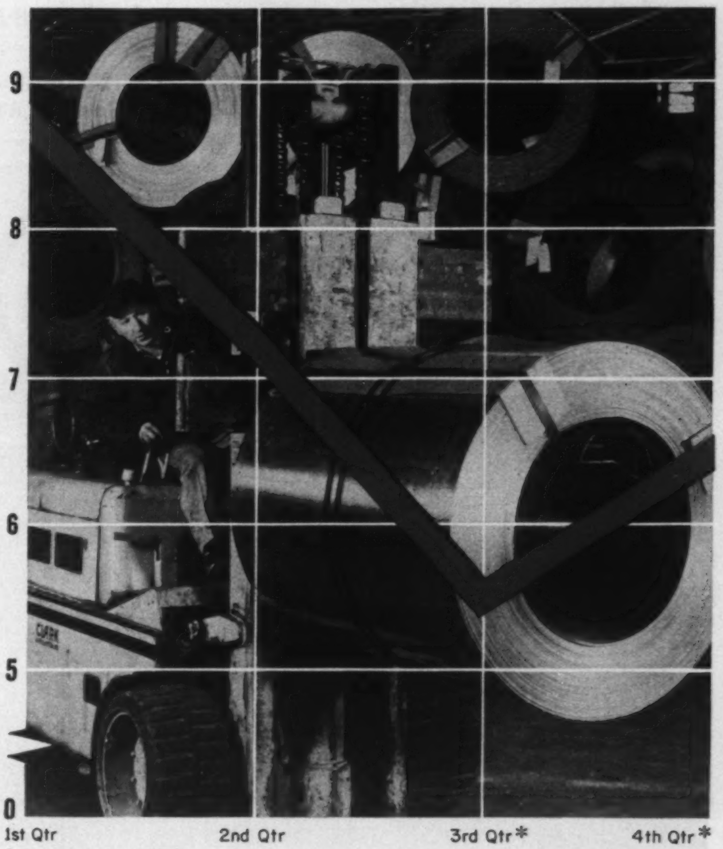
Sheet Shipments to Hit 6.5 Million Tons



4th Quarter Demand: Slow but Rising

(Shipments, millions of net tons)

*Estimated by STEEL.
Source: American Iron & Steel Institute.

THERE'S going to be no problem getting all the sheet steel you want this fall—and pretty much when you want it.

For consumers, that may be good news, but for producers it simply means that orders are again falling below expectations. Deliveries are expected to reach 6.5 million tons in the fourth quarter.

Last spring, when consumers began to cut inventories and steelmaking operations started to slip, many observers warned that inventories should not be allowed to get too low. "Comes fall," they cautioned, "everybody will be wanting sheets, and then you'll run into longer delivery times and possibly spot shortages."

• **Only Partly Right** — Inventory cutting has continued unabated, and in some cases stocks are ridiculously low. But there are no shortages. About the worst that will happen is that overnight delivery will become less common.

Producers of sheets are not optimistic these days. Says one Midwestern sales manager: "I'm not encouraged in any way." Auto demand is the brightest spot in the market picture, and it's getting tarnished around the edges. Appliance makers are not only well stocked with raw steel, but they have more unsold units from the factory to the retail outlets than they know what to do with. Service centers are well supplied and show no signs of becoming more so. Among the smaller users, the increase in small orders indicates they are nearing the bottom of their inventories, but they don't seem interested in building them up again.

• **Upturn Slow**—Here's the way the books look now: September is slightly better than August, which was only moderately better than July, the low month. (Total sheet shipments were only 1.7 million tons in July compared with 3 million tons in January.) October is up some from September but not as much as it should be during new model buildup of both autos and appliances. November is still sketchy, but it doesn't look a whole lot better than October. December? "Nobody but automakers are ordering that far ahead these days, and their bookings are inconclusive at this point," declares one steelman.

• **Problems**—For nonautomotive users, the big drawback still seems to be inventories. One producer told STEEL that customer stocks are about at the level he had anticipated a couple of months ago. "If they were still producing at the rate they were then, we'd be seeing more business on our end of it. But even today's low inventories are sufficient to cover many customer needs at current consumption rates."

In the automotive field, there are several problems. One is the unwieldy stock of 1960 models still in the showrooms. While motordom's officials publicly announce that the old model cleanup is no problem, they privately express concern over slow sales. To complicate the situation, dealers have large stocks of 1957 and 1958 used cars on hand, which they are pushing to compete with the compacts.

In addition, even the best planners in Detroit are still not certain how much steel they will need this year because they haven't decided on their mix of compacts and standard sized cars.

• When and How Much?—The market is not completely dismal. One Eastern producer is looking for a quickening of demand for galvanized sheets as the coastal area cleans up the mess caused by hurricane Donna. And a Midwest producer says his farm market is picking up a little. "We usually have our big season in the spring, but it didn't show up too well this year. We expect to make up for some of it this fall."

An Ohio producer reports that piling sheets are in heavier demand by the construction industry than they have been for some time.

A Chicago producer says that makers of metal office furniture are ordering at a better clip than most customers.

• Late in the Quarter—It all adds up to a later pickup in demand than most steelmen expected — perhaps nothing significant until late November or early December. As one sales manager summed it up: "We are hoping that our sheet demand will support an operating rate of 70 per cent in the fourth quarter, but some of our nonautomotive customers will have to come into the market fairly strong to achieve this."

Steel Bars . . .

Bar Prices, Page 209

There has been a little quickening of demand for carbon steel bars, but volume falls far short of producers' expectations for this season. Autobuilders are ordering a little more actively, but demand from other areas of consumption, such as heavy machinery and farm implements, is not up to expectations.

In cold finished bars, the market situation is little changed from that of recent weeks. Some more automotive business has been booked, but total volume is not large enough to take up the slack in the market generally. Shipments are readily available—in some cases from stock.

Tin Plate . . .

Tin Plate Prices, Page 211

U. S. Steel's recent announcement (STEEL, p. 175, Sept. 12) that it is making its new, ultrathin tin plate (Ferrolite) available in commercial quantities has given rise to speculation about the new product's impact on the tin plate market.

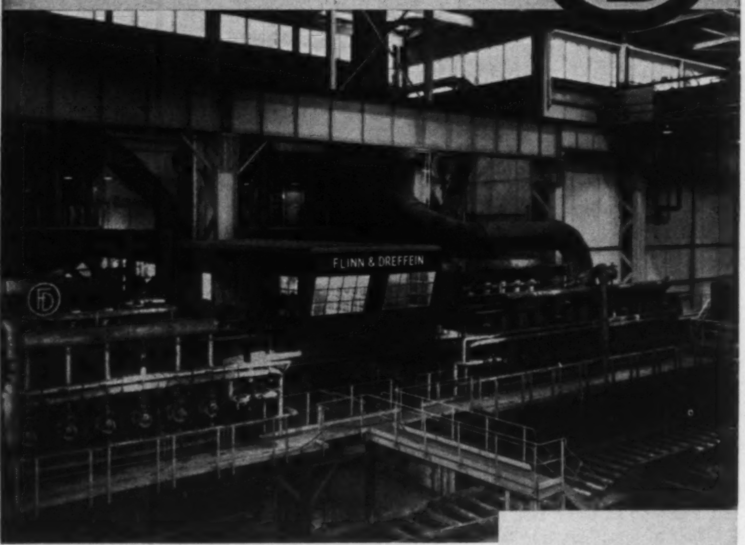
The new material is aimed at combating competition from aluminum for the can market, but the low prices quoted also raise the question whether standard specification tin plate prices will be eventually affected. Also, what will be the reaction of other tin plate producers?

Last week, Granite City Steel said it planned to bring out a similar product next April, and other producers are actively pushing their production plans for early introduction of their answer to the aluminum challenge in the can market.

The new product is priced $3 per basebox under standard tin plate weighing 100 lb per basebox. It is offered in basebox weights ranging from 45 to 60 lb. The standard basebox is 100 lb.

Except for a general statement giving a price range of $6.10 to $6.65 per basebox in the 45 lb to

. . . another first by Flinn & Dreffein . . .



Two new "Flinn & Dreffein Designed" 5-zone reheat furnaces made news recently when they were placed in operation at the new structural mill of United States Steel Corporation's South Works plant at Chicago.

The demand for larger sections, tonnage capacities and flexibility of heating operation dictated this advanced design.

Once again, Flinn and Dreffein experience and know-how reflected by user's confidence inspired Flinn and Dreffein engineers to further the development of reheat furnaces using the latest techniques and materials in furnace design.

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60 lb. range, U. S. Steel has not issued its usual published price schedule, although it is expected to do so shortly. However, the following base box prices, f.o.b. mill, reportedly apply:

Basebox	Irvin, Pa.	Gary, Ind.	Fairless, Pa.	Fairfield, Ala.
45 lb...	$6.10	$6.10	$6.20	$6.20
50 lb...	6.25	6.25	6.35	6.35
55 lb...	6.40	6.40	6.50	6.50
60 lb...	6.55	6.55	6.65	6.65

The quoted prices apply on 1/4 lb tin coated plate in coils weighing 12,000 lb and over. An extra of 50 cents is charged for cut sheets, 35 cents per basebox for coils 6000 to 12,000 lb, 50 cents for coils 4000 to 6000 lb, and $1 for coils under 4000 lb.

Tubular Goods . . .

Tubular Goods Prices, Page 214

With consumers' and distributors' stocks of oil country goods steadily shrinking, demand at the mill level is reportedly up slightly. One Pittsburgh area producer says its over-all business in August was 33 per cent over its July volume, and a substantial portion of the rise was due to better pipe demand in general.

Most of the pipe moving is on a prompt shipment basis, but there has been some pickup in forward ordering. Market observers say September volume will be 5 to 10 per cent over that in August.

The number of rotary oil rigs operating in the U. S. and Canada was 1848 in the latest weekly tabulation of the Hughes Tool Co., an increase of 30 over the preceding week.

Plates . . .

Plate Prices, Page 209

Sheared plate is available for delivery within ten days to two weeks, due to continued dullness. In some lines, demand is at a virtual standstill—railroad needs, for example. The Federal Power Commission has approved some long deferred pipelines, but this action has not yet been reflected in plate orders. Tankwork is spotty, but shipbuilding prospects are brighter, with the recent award of five ships of a modified C-4 design to the Newport News Shipbuilding & Dry Dock Co. for the U. S. Lines. The vessels will cost $53 million; the government paid a little more than half, primarily to cover higher cost of having the ships built in U. S. yards rather than abroad.

An increasing volume of high tensile alloy plates is being booked for high pressure vessels, but demand for plates generally shows little improvement. Fabricating shops are estimating light tonnage — weldments are prominent in the picture.

Distributors . . .

Prices, Page 215

Steel service centers note little improvement in business. Operators are still hopeful that September bookings will show a moderate gain over those of last month.

Stocks are adequate to meet current demand in all categories and are being replenished to maintain present levels. Plates may become tight within the next three or four weeks in the Birmingham district. Reason: "Several large plate orders have been placed with one steel producer by pipe fabricators."

Sizable stocks of Japanese steel (plates, reinforcing bars, and

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Now, you can make substantial savings on cleaning or descaling costs simply by changing over to "SUPER-STEEL" steel shot and grit. At $165.00 per ton, you'll really save money! And, you'll still enjoy fast and thorough cleaning, low abrasive consumption and low maintenance costs. As a matter of fact, "SUPER-STEEL" is *guaranteed* to equal the performance of any other steel abrasive.

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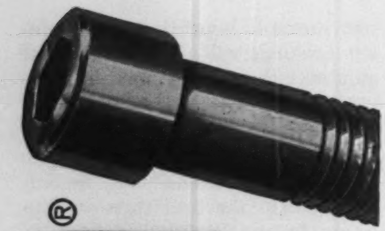

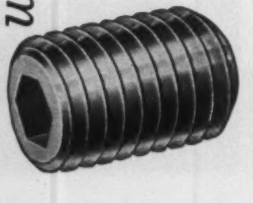

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shapes) are being offered to consumers in the Seattle area. Some importers there are evidently absorbing substantial losses. The continued invasion of the Alaskan market by Japanese producers is another handicap for U. S. industry. While published lists are unchanged, reports of price instability are current in the Pacific Northwest.

Tool Steel . . .

Tool Steel Prices, Page 214

Shipments of tool steels (excluding hollow drill steel) in July totaled 4684 net tons, reports the American Iron & Steel Institute. The movement in the preceding month was 7332 tons. In July, 1959, it was 6662 tons.

The total movement for the first seven months of this year was reported at 57,933 net tons compared with 61,598 in the like period last year.

Stainless Steel . . .

Stainless Steel Prices, Page 214

Shading of prices in the stainless market has been reported the last few weeks. Type 304 sheets and strip are now generally quoted at 52 cents vs. 55 cents a pound previously. At 52 cents, the grade is on the same price level as that quoted on Type 302 sheets and strip.

Last week, Carpenter Steel Co., Reading, Pa., and Republic Steel Corp., Cleveland, announced reductions on some forms of Type 304 and 304L stainless.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 216

Production of coke totaled 4,027,399 net tons (3,975,089 oven, and 52,310 beehive) in July, reports the Bureau of Mines. That compares with 4,602,281 tons (4,542,560 oven, 59,721 beehive) in June, and with 3,564,200 (3,498,100 oven, and 66,100 beehive) in July, 1959.

Output in the first seven months this year was 38,457,470 tons (37,784,956 oven, 672,514 beehive). It compared with 39,897,700 tons (39,106,000 oven, 791,700 beehive) in the same period last year.

Producers' stocks of oven coke at the end of July totaled 4,091,623 tons, equal to 31.9 days output. At the end of July, 1959, stocks amounted to 3,319,170 tons, equal to 18 days' production.

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2714 Mac Arthur Drive
Greensboro, North Carolina
Ross E. Allen, Manager
PHONE: BRoadway 2-7154

Wire . . .

Wire Prices, Pages 211 & 212

Deliveries of manufacturers' wire range from one to five weeks. In a few items, shipments appear to be a little more extended than they have been recently. Merchant wire products are available for shipment from stock.

Pig Iron . . .

Pig Iron Prices, Page 215

Demand for merchant iron is still down. Foundries are buying iron hand to mouth. In the Pittsburgh area, they are operating around 40 to 50 per cent of capacity. Some shops are doing better. A maker of gray iron castings reports business is the slowest it has been in two years. A producer of steel mill rolls isn't booking much new business but is still working off a fair order backlog.

Railroad casting business is disappointing, while demand for heavy machinery and implement castings has fallen far short of expectations. Automotive castings business is quickening a little, but volume is still far from that anticipated for this season.

Foundry operations in the Pittsburgh district have been adversely affected by curtailed steelmaking (intensified by strikes on U. S. Steel interplant railroads and until last week on the Pennsylvania railroad).

The pickup in blast furnace operations has not been as marked as had been forecast only a few weeks ago.

Iron Ore . . .

Iron Ore Prices, Page 216

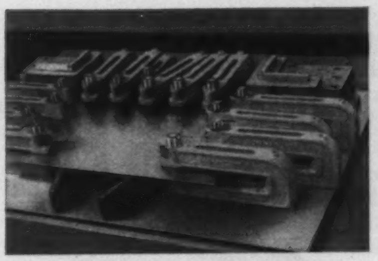
Shipments of Lake Superior iron ore in August totaled 10,017,693 gross tons, up 9,200,173 tons from shipments in the like month last year, reports the American Iron Ore Association. Shipments in the 1960 season to Sept. 1 were 52,283,519 tons, up 15,866,609 tons from the same period last year, when the ore movement was sharply curtailed by the steel strike.

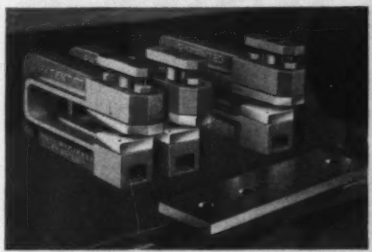
Structural Shapes . . .

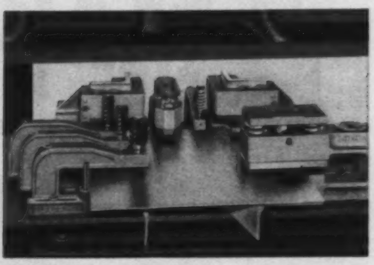
Structural Shape Prices, Page 209

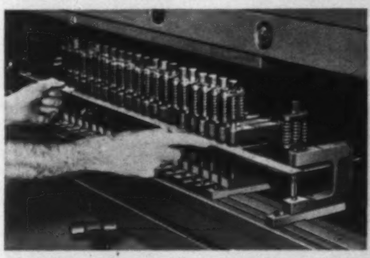
Shapemakers are in receipt of a little more business. The pickup is heartening because, normally, ordering slackens in the fall. Reason for

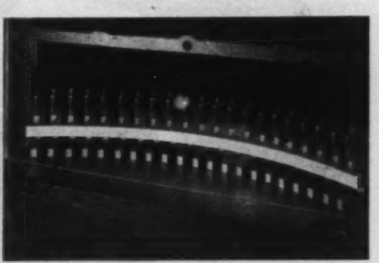
Cut costs with
STRIPPIT
Self-Contained
Tooling

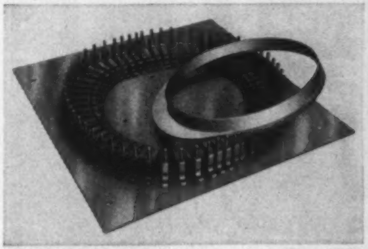

STRIPPIT eliminates expensive custom dies. Type "BL" Units in press setup save time and cost needed to design and build single-purpose dies. "BL" Units punch holes to 3.500" diameter in ⅛" material.

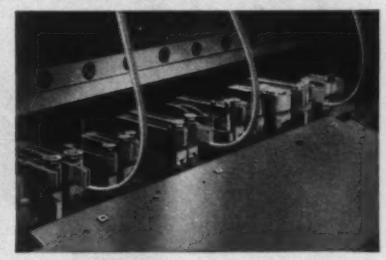

STRIPPIT shortens lead time . . . setup of Type "HS" Hydra-Strip Units shows ¾" thick punched piece in foreground. STRIPPIT tooling like this can be set up *immediately* after the pattern is O.K.'d.


STRIPPIT assures minimum investment. "CJ" Units punch numerous hole sizes to 3.500" diameter. Simply replace punches and dies! Re-using units cuts investment in idle dies, minimizes storage problem.


STRIPPIT lowers labor costs. Typical setup of Type "C" Units can be set up by most bench men. No high-salaried tool and die makers needed. "C" Units punch holes to .3125" diameter in ⅛" material.


STRIPPIT sets up faster. Type "E" Units are permanently aligned to punch holes in channels and shapes. Pilot pin and punch are concentric for fast, accurate positioning on precision-drilled template.


STRIPPIT cuts press downtime. Type "H" Unit setup ready to move into press after previous run is finished. Nothing attaches to the press ram. Type "H" Units punch holes to .500" diameter in ⅛" material.


STRIPPIT versatility is unlimited. Type "BL" Pierce Nut Units punch and stake Fabristeel Multipierce Nuts, can emboss simultaneously. STRIPPIT units can be set up in any hole pattern and used repeatedly.

Write for the new STRIPPIT General Catalog

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210 Buell Road • Akron, New York
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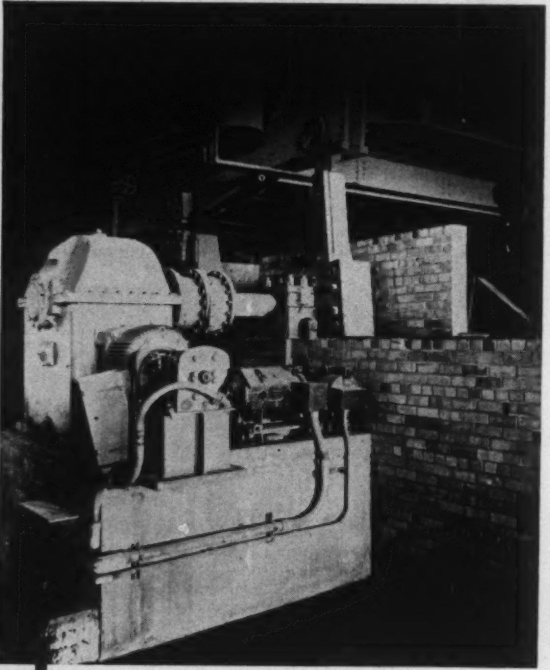
Catalog 60 and Stock List.

Tilting 700-tons of steel furnace



CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

Here's a closeup of tilting mechanism for an electric furnace. Standard, stock model, double-reduction Cone-Drive **double-enveloping worm** gear speed reducer tilts furnace and heat with combined weight of 700 tons.

Powerful Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

the upturn: Some fabricating work that has been held up is coming out. Sellers think their bookings will hold up fairly well through October.

A. J. Paddock, president, American Bridge Div., U. S. Steel Corp., said last week that research is progressing on a sprayed on fireproofing compound for structural steel. He thinks the use of color has many possibilities, including innovations in architectural applications.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

8050 tons, Queens Central Repair Shop, New York Department of Public Works, New York, through M. Melnick & Co. Inc., general contractor to the American Bridge Div., U. S. Steel Corp., Pittsburgh.

4060 tons, Vantage Bridge, Washington State, Columbia River, superstructure, to American Bridge Div., U. S. Steel Corp., Portland, Oreg., at $2,962,524.

1525 tons, bus turnaround, George Washington Bridge, New York, to Bethlehem Steel Co., Bethlehem, Pa.

685 tons, two railroad and one highway bridges, Arapahoe County, Colo., for State of Colorado, to Burkhardt Steel Co., Denver.

422 tons, regional high school, Raynham-Bridgewater, Mass., to John E. Cox & Co. Inc., Fall River, Mass.; Olsen-Appleby Inc., New Bedford, Mass., general contractor; reinforcing bars to Plantations Steel Co., Providence, R. I.

350 tons, including reinforcing bars, junior high school, North Attleboro, Mass., Builders' Iron Works, Somerville, Mass. (structurals), and Plantations Steel Co., Providence, R. I. (reinforcing); Westcott Construction Co., North Attleboro, general contractor.

250 tons, Washington State highway bridge, Snohomish County, to United Concrete Pipe Corp., Auburn, Wash.; Neukirch Bros., Seattle, general contractor.

STRUCTURAL STEEL PENDING

7000 tons, Alexander Hamilton Bridge, across Harlem River, New York; bids close Sept. 21.

1996 tons, state bridgework, Suffolk County, New York, De Lillo Construction Co. low on the general contract.

1978 tons, state highway bridge, Ulster County, New York, John Artorie Inc., Poughkeepsie, N. Y., low on the general contract.

1920 tons, access highway, Dulles International Airport, Fairfax County, Virginia; L. G. De Felice, New Haven, Conn., low on the general contract.

1470 tons, building, Department of Public Works, Rikers Island, New York; bids Sept. 28.

1065 tons, state highway bridge, Middlesex County, New Jersey, Porier-McLane, New York, low on the general contract.

900 tons, junior high school, Massapequa, N. Y., Joseph Bisceglia is low on the general contract.

750 tons, building, Industrial Fine Arts, Buffalo; bids closed.

750 tons, state bridgework, Saratoga County, New York; bids Sept. 21.

720 tons, state bridgework, Saratoga County, New York; bids Sept. 21.

675 tons, project, American Electric Power Co., New York, at Roanoke, Va.

650 tons, estimated, St. Charles Hospital, Port Jefferson, N. Y.; bids Sept. 20.

650 tons, post office terminal, Harrisburg, Pa., bids Oct. 13.

447 tons, state bridgework, Niagara County, New York.

350 tons, distribution building, Western Electric Co., Nashville, Tenn.

350 tons, Macy Department Store addition, White Plains, N. Y.; bids Sept. 20.

300 tons, municipal parking development, New Haven, Conn.; Fusco-Amatruda, New Haven, low on the general contract.

156 tons, state bridgework, Lawrence County, Pennsylvania; bids Sept. 30.
100 tons, fish hopper facilities, Mayfield Dam; Star Iron & Steel Co., Tacoma, Wash., low at $26,167 to Tacoma.
250 tons, also 57 tons of reinforcing, Rockport Bridge, Skagit County, Washington; bids Sept. 19; Frank Gilkey, county engineer.
250 tons, post office terminal annex, Philadelphia, bids Oct. 10.
200 tons, building, General Electric Co. at Emporium, Pa.; bids closed.
200 tons, 346 ft. South Santiam River bridge, Oregon; general contract to Tom Lillebo, Reedsport, at $134,244 by Linn County.

REINFORCING BARS . . .

REINFORCING BARS PLACED

225 tons, three, composite, wide flange beam bridges, contract 3, Bolton, Vt., to Joseph T. Ryerson & Son Inc., Boston; Landers & Griffin Inc., Portsmouth, N. H., general contractor; also, 105 tons of steel piling, to Bethlehem Steel Co., Bethlehem, Pa.

REINFORCING BARS PENDING

640 tons, Mayfield Dam, Tacoma, Wash.; bids in.
450 tons, Biggs Rapids, Columbia River bridge; bonds sold and general contract awarded Paul Jarvis Inc., Seattle.
375 tons, Washington State, Cowlitz County girder spans; general contract to Hannan Bros. Co., Portland, Oreg., low at $357,755.
300 tons, General Services office building, Anchorage, Alaska; Lease Co., Seattle, general contractor.

PLATES . . .

PLATES PLACED

1157 tons, high tensile, grade Hy-80, Navy purchasing office, Washington, to U. S. Steel Corp., Pittsburgh.
365 tons, three tanks, Tidewater Oil Co., East Providence, R. I., to Chicago Bridge & Iron Co., Chicago.
223 tons, hull, Navy General Supply Officer, Philadelphia, to Kaiser Steel Corp., New York; 67 tons of stainless plates to Eastern Stainless Steel Corp., Baltimore.
200 tons, standpipe, Plainfield Union Co., Scotch Plains, N. J., to Fisher Tank Co., Chester, Pa.

PLATES PENDING

450 tons, Marble Hills pumping station, Riverdale, N. Y.; low jointly on the general contract are McLane-Grove, New York, and Zephyr Construction Co., Brooklyn, N. Y.
400 tons, four storage tanks for Hanford Works, Washington State; Graver Tank & Mfg. Co., Salt Lake City, Utah, low at $238,061 to Kaiser Engineers, prime contractor.

Steel Production Gains Slightly During August

Production of steel in August totaled 6,836,000 net tons, reports the American Iron & Steel Institute. That was an increase of 485,076 tons over July's output. Ingot operations averaged 54.2 per cent in August vs. 50.3 in July.

During the first eight months this year, ingot output totaled 73,941,019 net tons compared with 70,949,656 tons in the comparable 1959 period. The average operating rate for the first eight months was 74.4 per cent.

The institute's index of steelmaking (in terms of average production during 1947-49) in August was 96.1 vs. 89.3 in July, and 20.2 in August, 1959, when most of the mills were closed by a strike. The index for the first eight months of the year was 132.1 against 127.2 in the same 1959 period.

Steel Ingot Production—August, 1960

Period	OPEN HEARTH (Net tons)	BESSEMER (Net tons)	OXYGEN PROCESS (Net tons)	ELECTRIC (Net tons)	TOTAL (Net tons)	Percentage of capacity
1960						
January	10.510.616	211,132	280.981	1,046.675	12.049 404	95.5
February ...	9.715.527	215.263	245.458	949.558	11.126.806	94.3
March	10,103.122	202.812	306.741	952,008	11.564.683	91.6
1st Qtr	30.329.265	630.207	833,180	2,948,241	34.740.893	93.8
April	8.603.306	105.336	302.763	766.452	9.777.857	80.1
May	7.844.140	73,010	309.505	603.817	8.830.472	70.0
*June	6.441.594	80.344	314.766	568.169	7.404.873	60.6
*2nd Qtr. ..	22.889.040	258.690	927.034	1,938.438	26.013.202	70.2
1st Half ...	53,218.305	888.897	1,760.214	4,886.679	60.754.095	82.0
*July	5,494.831	61,700	289.003	505.850	6.350,924	50.3
†August	5,860,000	53,000	280,000	643,000	6,836,000	54.2
1959						
January ...	8,280,985	120,005	186,820	729.575	9.317.385	74.3
February ...	8,541.031	128.515	176.970	756.422	9.602.938	84.8
March	10,216,474	184.892	236.595	929,784	11,567.745	92.3
1st Qtr	27,038,490	433,412	600,385	2,415,781	30,488,068	83.8
April	9.884,322	195.730	237.018	964,850	11,281,920	93.0
May	10,117.968	200.887	257.325	1,024,401	11.600,581	92.5
June	9.521.053	185.794	259.731	941,056	10,907.634	89.9
2nd Qtr	29.523.343	582.411	754.074	2,930.307	33.790.135	91.8
1st 6 Mo. ..	56,561,833	1,015.823	1,354,459	5,346,088	64,278,203	87.8
July	4,541,741	66,433	98,634	525,368	5.232.176	41.7
August	1,171,342	......	......	267.935	1,439.277	11.5
September ..	1,249,398	......	......	285,619	1,535.017	12.7
3rd Qtr	6.962,481	66,433	98.634	1,078.922	8.206.470	22.1
9 Mo.	63,524,314	1,082,256	1,453,093	6.425.010	72,484,673	65.6
October	1,385,490	......	......	319 043	1,704.533	13.6
November ..	6.290,659	92.361	129.794	754,793	7,267,607	59.9
December ..	10.468,534	205.666	281,451	1,033.668	11,989.319	95.6
4th Qtr	18,144,683	298.027	411,245	2,107,504	20.961.459	56.3
2nd 6 Mo...	25,107.164	364.460	509,879	3,186,426	29,167,929	39.2
Totals	81,668,997	1,380,283	1,864,338	8,532.514	93,446,132	63.3

Note—The percentages are based on annual capacities as of Jan. 1, 1960: Open hearth, 126,621,-630 net tons; bessemer, 3,396,000 net tons; basic oxygen process, 4,157,400 net tons; electric and crucible, 14,395,940 net tons. Total: 148,570,970 net tons. In 1959, the capacity tonnages were: Open hearth, 126,528,380 net tons; bessemer, 3,577,000 net tons; basic oxygen process, 4,033,160 net tons; electric and crucible, 13,495,130 net tons. Total: 147,633,670 net tons.
†Preliminary. *Revised.

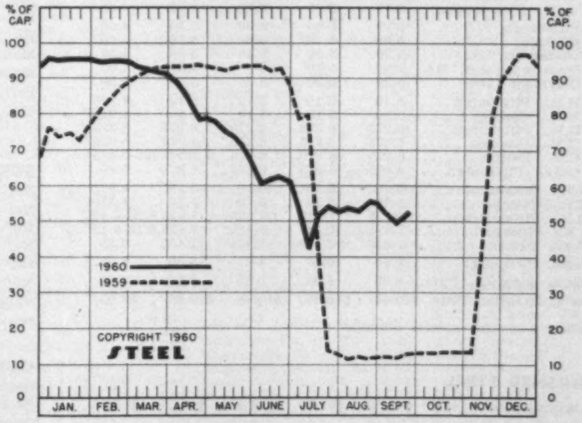
DISTRICT INGOT RATES

(Percentage of capacity utilized)

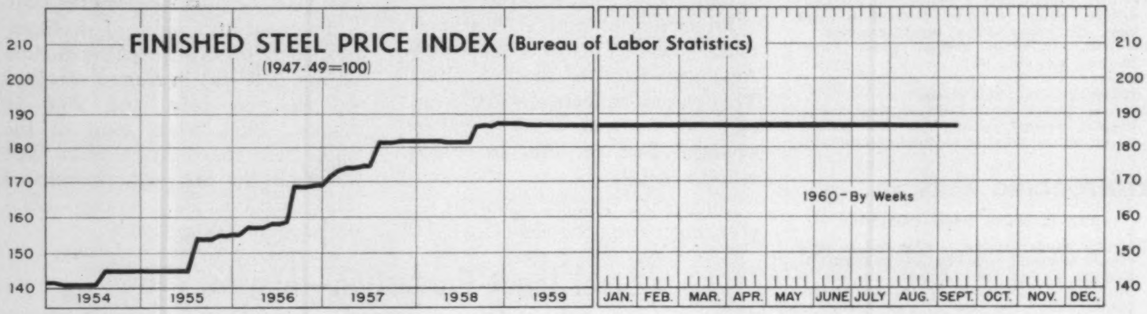
	Week Ended Sept. 18	Week Ago	Month Ago	Year Ago
Northeastern	56	53	62	*
Buffalo	59	55	59	*
Pittsburgh	44	38	47	*
Youngstown	42	36	45	*
Cleveland	52	45	51	*
Detroit	72	70	77	*
Chicago	60	58	58	*
Cincinnati	55	53	55	*
St. Louis	72	64	68	*
Southern	47	50	59	*
Western	56	52	49	*
Total Industry .	52.7	49.2	54.7	12.6
Index .... (1947-49=100)	93.6	87.2	97.0	22.2
Net Tons ..... (In thousands)	1,503	1,401	1,558	356

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,-331 in 1959. Source: American Iron & Steel Institute. *Not available due to general strike.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Sept. 13, 1960	Week Ago	Month Ago	Aug. Index	Year Ago
186.2	**186.2**	**186.2**	**186.2**	**186.7**

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Sept. 13

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1 ...	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb) ...	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.335
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe, Line (100 ft)	195.430
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft) ...	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	195.395
Tin plate, Hot-dipped, 1.25 lb (95 lb base box) ...	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon ...	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (bundles)	7.647
Nails, Wire, 8d Common.	9.433
Wire, Barbed(80-rod spool)	8.414
Woven Wire Fence (20-rod roll)	21.003

STEEL's FINISHED STEEL PRICE INDEX

	Sept. 14 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100) ..	247.82	247.82	247.82	247.82	207.63
Index in cents per lb	6.713	6.713	6.713	6.713	5.625

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$127.41
No. 2 Fdry, Pig Iron, GT.	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT ...	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	32.33	32.33	32.33	41.00	44.33

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Sept 14 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh ...	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia..	5.77	5.77	5.77	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.50
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.50
Sheets, H.R., Pittsburgh ...	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh ...	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh ..	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25-6.45
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35-6.45
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb)box,Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{5}{8}$" Pitts. ...	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Sept. 14 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia ..	70.41	70.41	70.41	70.41	59.16
No. 2 Fdry, NevilleIsland,Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila. ..	70.91	70.91	70.91	70.91	59.66
No. 2 Fdry, Birmingham ..	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.),deld.,Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†..	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$30.50	$30.50	$30.50	$41.50	$43.50
No. 1 Heavy Melt, E. Pa. .	35.00	35.00	35.00	41.00	46.50
No. 1 Heavy Melt, Chicago .	31.50	31.50	31.50	40.50	42.00
No. 1 Heavy Melt, Valley ..	33.50	33.50	33.50	41.50	46.50
No. 1 Heavy Melt, Cleve. ..	31.50	31.50	31.50	38.50	44.00
No. 1 Heavy Melt, Buffalo.	29.50	29.50	29.50	33.50	39.50
Rails, Rerolling, Chicago ...	53.50	53.50	53.50	62.50	64.50
No. 1 Cast, Chicago	40.50	40.50	42.50	55.50	46.50

COKE, Net Ton

Beehive, Furn., Connlsvl. ..	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connlsvl. ..	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee ...	32.00	32.00	32.00	32.00	26.25

Steel Prices

Mill prices as reported to STEEL, Sept. 14, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 210; footnotes, page 212.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5	$76.00

INGOTS, Alloy (NT)

Detroit S41	$82.00
Economy,Pa. B14	82.00
Farrell,Pa. S3	82.00
Lowellville,O. S3	82.00
Midland,Pa. C18	82.00
Munhall,Pa. U5	82.00
Sharon,Pa. S3	82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)

Bartonville,Ill. K4	$82.00
Bessemer,Pa. U5	80.00
Buffalo R2	80.00
Clairton,Pa. U5	80.00
Ensley,Ala. T2	80.00
Fairfield,Ala. T2	80.00
Fontana,Calif. K1	90.50
Gary,Ind. U5	80.00
Johnstown,Pa. B2	80.00
Lackawanna,N.Y. B2	80.00
Munhall,Pa. U5	80.00
Owensboro,Ky. G8	80.00
S.Chicago,Ill. R2, U5	80.00
S.Duquesne,Pa. U5	80.00
Sterling,Ill. N15	80.00
Youngstown R2	80.00

Carbon, Forging (NT)

Bessemer,Pa. U5	$99.50
Buffalo R2	99.50
Canton,O. R2	102.00
Clairton,Pa. U5	99.50
Conshohocken,Pa. A3	104.50
Ensley,Ala. T2	99.50
Fairfield,Ala. T2	99.50
Farrell,Pa. S3	99.50
Fontana,Calif. K1	109.00
Gary,Ind. U5	99.50
Geneva,Utah C11	99.50
Houston S5	104.50
Johnstown,Pa. B2	99.50
Lackawanna,N.Y. B2	99.50
LosAngeles B3	109.00
Midland,Pa. C18	99.50
Munhall,Pa. U5	99.50
Owensboro,Ky. G8	99.50
Seattle B3	109.00
Sharon,Pa. S3	99.50
S.Chicago R2, U5, W14	99.50
S.Duquesne,Pa. U5	99.50
S.SanFrancisco B3	109.00
Warren,O. C17	99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2	$119.00
Bridgeport,Conn. C32	119.00
Buffalo R2	119.00
Canton,O. R2, T7	119.00
Conshohocken,Pa. A3	126.00
Detroit S41	119.00
Economy,Pa. B14	119.00
Farrell,Pa. S3	119.00
Fontana,Calif. K1	140.00
Gary,Ind. U5	119.00
Houston S5	124.00
Ind.Harbor,Ind. Y1	119.00
Johnstown,Pa. B2	119.00
Lackawanna,N.Y. B2	119.00
LosAngeles B3	139.00
Lowellville,O. S3	119.00
Massillon,O. R2	119.00
Midland,Pa. C18	119.00
Munhall,Pa. U5	119.00
Owensboro,Ky. G8	119.00
Sharon,Pa. S3	119.00
S.Chicago R2,U5,W14	119.00
S.Duquesne,Pa. U5	119.00
Struthers,O. Y1	119.00
Warren,O. C17	119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2	$122.50
Canton,O. R2	125.00
Cleveland R2	122.50
Gary,Ind. U5	122.50
S.Chicago,Ill. R2,W14	122.50
S.Duquesne,Pa. U5	122.50
Warren,O. C17	122.50

SKELP

Aliquippa,Pa. J5	5.05
Benwood,W.Va. W10	5.05
Ind.Harbor,Ind. Y1	5.05
Munhall,Pa. U5	5.05
Pittsburgh J5	5.05
Warren,O. R2	5.05
Youngstown R2, U5	5.05

WIRE RODS

AlabamaCity,Ala. R2	6.40
Aliquippa,Pa. J5	6.40
Alton,Ill. L1	6.60
Bartonville,Ill. K4	6.50
Buffalo W12	6.40
Cleveland A7	6.40
Donora,Pa. A7	6.40
Fairfield,Ala. T2	6.40
Houston S5	6.65
IndianaHarbor,Ind. Y1	6.40
Johnstown,Pa. B2	6.40
Joliet,Ill. A7	6.40
KansasCity,Mo. S5	6.65
Kokomo,Ind. C16	6.50
LosAngeles B3	7.20
Minnequa,Colo. C10	6.65
Monessen,Pa. P7	6.40
Pittsburg,Calif. C11	7.20
Portsmouth,O. P12	6.40
Roebling,N.J. R5	6.50
S.Chicago,Ill. R2, W14	6.40
SparrowsPoint,Md. B2	6.50
Sterling,Ill.(1) N15	6.40
Sterling,Ill. N15	6.50
Struthers,O. Y1	6.40
Worcester,Mass. A7	6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2	5.50
Aliquippa,Pa. J5	5.50
Atlanta A11	5.70
Bessemer,Ala. T2	5.50
Bethlehem,Pa. B2	5.55
Birmingham C15	5.50
Clairton,Pa. U5	5.50
Fairfield,Ala. T2	5.50
Fontana,Calif. K1	6.30
Gary,Ind. U5	5.50
Geneva,Utah C11	5.50
Houston S5	5.60
Ind Harbor,Ind. I-2, Y1	5.50
Johnstown,Pa. B2	5.55
Joliet,Ill. P22	5.50
KansasCity,Mo. S5	5.60
Lackawanna,N.Y. B2	5.55
LosAngeles B3	6.20
Minnequa,Colo. C10	5.80
Munhall,Pa. U5	5.50
Niles,Calif. P1	6.25
Phoenixville,Pa. P4	5.55
Portland,Oreg. O4	6.25
Seattle B3	6.25
S.Chicago,Ill. U5, W14	5.50
S.SanFrancisco B3	6.15
Sterling,Ill. N15	5.50
Torrance,Calif. C11	6.20
Weirton,W.Va. W6	5.50

Wide Flange

Bethlehem,Pa. B2	5.55
Clairton,Pa. U5	5.50
Fontana,Calif. K1	6.45
IndianaHarbor,Ind. I-2	5.50
Lackawanna,N.Y. B2	5.55
Munhall,Pa. U5	5.50
Phoenixville,Pa. P4	5.55
S.Chicago,Ill. U5	5.50
Sterling,Ill. N15	5.50
Weirton,W.Va. W6	5.50

Alloy Std. Shapes

Aliquippa,Pa. J5	6.80
Clairton,Pa. U5	6.80
Gary,Ind. U5	6.80
Houston S5	6.90
Munhall,Pa. U5	6.80
S.Chicago,Ill. U5, W14	6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5	8.05
Bessemer,Ala. T2	8.05
Bethlehem,Pa. B2	8.10
Clairton,Pa. U5	8.05
Fairfield,Ala. T2	8.05
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.05
Geneva,Utah C11	8.05
Houston S5	8.15
Ind.Harbor,Ind. I-2, Y1	8.05
Johnstown,Pa. B2	8.10
KansasCity,Mo. S5	8.15
Lackawanna,N.Y. B2	8.10
LosAngeles B3	8.75
Munhall,Pa. U5	8.05
Seattle B3	8.80
S.Chicago,Ill. U5, W14	8.05
S.SanFrancisco B3	8.70
Sterling,Ill. N15	7.75
Struthers,O. Y1	8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2	8.10
Ind.Harbor,Ind. I-2	8.05
Lackawanna,N.Y. B2	8.10
Munhall,Pa. U5	8.05
S.Chicago,Ill. U5	8.05
Sterling,Ill. N15	7.75

PILING

BEARING PILES

Bethlehem,Pa. B2	5.55
Ind.Harbor,Ind. I-2	5.50
Lackawanna,N.Y. B2	5.55
Munhall,Pa. U5	5.50
S.Chicago,Ill. I-2, U5	5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2	6.50
Lackawanna,N.Y. B2	6.50
Munhall,Pa. U5	6.50
S.Chicago,Ill. I-2, U5	6.50
Weirton,W.Va. W6	6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2	5.30
Aliquippa,Pa. J5	5.30
Ashland,Ky.(15) A10	5.30
Atlanta A11	5.50
Bessemer,Ala. T2	5.30
Clairton,Pa. U5	5.30
Claymont,Del. C22	5.30
Cleveland J5, R2	5.30
Coatesville,Pa. L7	5.30
Conshohocken,Pa. A3	5.30
Ecorse,Mich. G5	5.30
Fairfield,Ala. T2	5.30
Farrell,Pa. S3	5.30
Fontana,Calif.(30) K1	6.10
Gary,Ind. U5	5.30
Geneva,Utah C11	5.30
GraniteCity,Ill. G4	5.40
Harrisburg,Pa. P4	5.30
Houston S5	5.40
Ind.Harbor,Ind. I-2, Y1	5.30
Johnstown,Pa. B2	5.30
Lackawanna,N.Y. B2	5.30
Mansfield,O. E6	5.30
Minnequa,Colo. C10	6.15
Munhall,Pa. U5	5.30
Newport,Ky. A2	5.30
Pittsburgh J5	5.30
Riverdale,Ill. A1	5.30
Seattle B3	6.20
Sharon,Pa. S3	5.30
S.Chicago,Ill. U5, W14	5.30
SparrowsPoint,Md. B2	5.30
Sterling,Ill. N15	5.30
Steubenville,O. W10	5.30
Warren,O. R2	5.30
Youngstown U5, Y1	5.30
Youngstown(27) R2	5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. C22	7.05
Fontana,Calif. K1	7.85
Geneva,Utah C11	7.05
Houston S5	7.15
Johnstown,Pa. B2	7.05
SparrowsPoint,Md. B2	7.05

PLATES, Wrought Iron

Economy,Pa. B14	14.10

PLATES, H.S., L.A.

Aliquippa Pa. J5	7.95
Ashland,Ky. A10	7.95
Bessemer,Ala. T2	7.95
Clairton,Pa. U5	7.95
Claymont,Del. C22	7.95
Cleveland J5, R2	7.95
Coatesville,Pa. L7	7.95
Conshohocken,Pa. A3	7.95
Economy Pa. B14	7.95
Ecorse,Mich. G5	7.95
Fairfield,Ala. T2	7.95
Farrell,Pa. S3	7.95
Fontana,Calif.(30) K1	8.75
Gary,Ind. U5	7.95
Geneva,Utah C11	7.95
Houston S5	8.05
Ind.Harbor,Ind. I-2, Y1	7.95
Johnstown,Pa. B2	7.95
Munhall,Pa. U5	7.95
Pittsburgh J5	7.95
Seattle B3	8.85
Sharon,Pa. S3	7.95
S.Chicago,Ill. U5, W14	7.95
SparrowsPoint,Md. B2	7.95
Sterling,Ill. N15	7.625
Warren,O. R2	7.95
Youngstown U5, Y1	7.95

PLATES, Alloy

Aliquippa,Pa. J5	7.50
Claymont,Del. C22	7.50
Coatesville,Pa. L7	7.50
Economy,Pa. B14	7.50
Farrell,Pa. S3	7.50
Fontana,Calif. K1	8.30
Gary,Ind. U5	7.50
Houston S5	7.60
Ind.Harbor,Ind. Y1	7.50
Johnstown,Pa. B2	7.50
Lowellville,O. S3	7.50
Munhall,Pa. U5	7.50
Newport,Pa. A2	7.50
Pittsburgh J5	7.50
Seattle B3	8.40
Sharon,Pa. S3	7.50
S.Chicago,Ill. U5, W14	7.50
SparrowsPoint,Md. B2	7.50
Youngstown Y1	7.50

FLOOR PLATES

Cleveland J5	6.375
Conshohocken,Pa. A3	6.375
Ind.Harbor,Ind. I-2	6.375
Munhall,Pa. U5	6.375
Pittsburgh J5	6.375
S.Chicago,Ill. U5	6.375

PLATES, Ingot Iron

Ashland c.l.(15) A10	5.55
Ashland l.c.l.(15) A10	6.05
Cleveland c.l. R2	6.05
Warren,O. R2	6.05

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)

Ala.City,Ala.(9) R2	5.675
Aliquippa,Pa.(9) J5	5.675
Alton,Ill. L1	5.875
Atlanta(9) A11	5.875
Bessemer,Ala.(9) T2	5.675
Birmingham(9) C15	5.675
Buffalo(9) R2	5.675
Canton,O.(23) R2	6.15
Clairton,Pa.(9) U5	5.675
Cleveland(9) R2	5.675
Ecorse,Mich.(9) G5	5.675
Emeryville,Calif. J7	6.425
Fairfield,Ala.(9) T2	5.675
Fairless,Pa.(9) U5	5.825
Fontana,Calif.(9) K1	6.375
Gary,Ind.(9) U5	5.675
Houston(9) S5	5.925
Ind.Harbor(9) I-2, Y1	5.675
Johnstown,Pa.(9) B2	5.675
Joliet,Ill. P2	5.675
KansasCity,Mo.(9) S5	5.925
Lackawanna(9) B2	5.675
LosAngeles(9) B3	6.375
Massillon,O.(23) R2	6.15
Midland,Pa.(23) C18	6.025
Milton,Pa. M18	5.825
Minnequa,Colo. C10	6.125
Niles,Calif. P1	6.375
Owensboro,Ky.(9) G8	6.025
Pittsburg,Calif.(9) C11	6.375
Pittsburgh(9) J5	5.675
Portland,Oreg. O4	6.425
Riverdale,Ill.(9) A1	5.675
Seattle(9) A24,B3,N15	6.425
S.Ch'c'go(9)R2,U5,W14	5.675
S.Duquesne,Pa.(9) U5	5.675
S.SanFran.,Calif.(9)B3	6.425
Sterling,Ill.(1)(9) N15	5.675
Sterling,Ill.(9) N15	5.775
Struthers,O.(9) Y1	5.675
Tonawanda,N.Y. B12	5.675
Torrance,Calif.(9) C11	6.375
Warren,O C17	6.025
Youngstown(9) R2,U5	5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5	6.725
Bethlehem,Pa. B2	6.725
Bridgeport,Conn. C32	6.80
Buffalo R2	6.725
Canton,O. R2, T7	6.725
Clairton,Pa. U5	6.725
Detroit S41	6.725
Economy,Pa. B14	6.725
Ecorse,Mich. G5	6.725
Fairless,Pa. U5	6.875
Farrell,Pa. S3	6.725
Fontana,Calif. K1	7.775
Gary,Ind. U5	6.725
Houston S5	6.975
Ind.Harbor,Ind. I-2, Y1	6.725
Johnstown,Pa. B2	6.725
KansasCity,Mo. S5	6.975
Lackawanna,N.Y. B2	6.725
LosAngeles B3	7.775
Lowellville,O. S3	6.725
Massillon,O. R2	6.725
Midland,Pa. C18	6.725
Owensboro,Ky. G8	6.725
Pittsburgh J5	6.725
Sharon,Pa. S3	6.725
S.Chicago R2, U5, W14	6.725
S.Duquesne,Pa. U5	6.725
Struthers,O. Y1	6.725
Warren,O. C17	6.725
Youngstown U5	6.725

BARS & SMALL SHAPES, H.R.
High-Strength, Low-Alloy

Aliquippa,Pa. J5	8.30
Bessemer,Ala. T2	8.30
Bethlehem,Pa. B2	8.30
Clairton,Pa. U5	8.30
Cleveland R2	8.30
Ecorse,Mich. G5	8.30
Fairfield,Ala. T2	8.30
Fontana,Calif. K1	9.00
Gary,Ind. U5	8.30
Houston S5	8.55
Ind.Harbor,Ind. Y1	8.30
Johnstown,Pa. B2	8.30
KansasCity,Mo. S5	8.55
Lackawanna,N.Y. B2	8.30
LosAngeles B3	9.00
Pittsburgh J5	8.30
Seattle B3	9.05
S.Chicago,Ill. R2, W14	8.30
S.Duquesne,Pa. U5	8.30
S.SanFrancisco B3	9.05
Sterling,Ill. N15	7.925
Struthers,O. Y1	8.30
Youngstown U5	8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2	5.825
Houston(9) S5	5.925
KansasCity,Mo.(9) S5	5.925
Lackawanna(9) B2	5.675
Sterling,Ill. N15	5.775
Sterling,Ill.(1) N15	5.675
Tonawanda,N.Y. B12	5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5	5.675
Atlanta A11	5.875
Joliet,Ill. P22	5.675
Minnequa,Colo. C10	6.125
Niles,Calif. P1	6.375
Pittsburgh J5	5.675
Portland,Oreg. O4	6.425
SanFrancisco S7	6.52
Seattle B3	6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron

Economy,Pa. B14	16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5	6.80
Clairton,Pa. U5	6.80
Gary,Ind. U5	6.80
Houston S5	7.05
KansasCity,Mo. S5	7.05
Pittsburgh J5	6.80
Youngstown U5	6.80

BARS, C.F. Leaded
(Including leaded extra)

Carbon

LosAngeles P2 S30	11.75*

Alloy

Ambridge,Pa. W18	10.175
BeaverFalls,Pa. M12	10.175
Camden,N.J. P13	10.35
Chicago W18	10.175
Elyria,O. W8	10.175
Monaca,Pa. S17	10.175
Newark,N.J. W18	10.35
SpringCity,Pa. K3	10.35

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*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18	7.65
BeaverFalls,Pa. M12,R2	7.65
Birmingham C15	8.25
Buffalo B5	7.70
Camden,N.J. P13	8.10
Carnegie,Pa. C12	7.65
Chicago W18	7.65
Cleveland A7, C20	7.65
Detroit B5, P17	7.85
Detroit S41	7.65
Donora,Pa. A7	7.65
Elyria,O. W8	7.65
FranklinPark,Ill. N5	7.65
Gary,Ind. R2	7.65
GreenBay,Wis. F7	7.65
Hammond,Ind. J5, L2	7.65
Hartford,Conn. R2	8.15
Harvey,Ill. B5	7.65
LosAngeles(49) S30	9.10
LosAngeles(49) P2, R2	9.10
Mansfield,Mass. B5	8.20
Massillon,O. R2, R8	7.65
Midland,Pa. C18	7.65
Monaca,Pa. S17	7.65
Newark,N.J. W18	8.10
NewCastle,Pa.(17) B4	7.65
Pittsburgh J5	7.65
Plymouth,Mich. P5	7.90
Putnam,Conn. W18	8.20
Readville,Mass. C14	8.20
Seattle(49) S30	9.10
S.Chicago,Ill. W14	7.65
SpringCity,Pa. K3	8.10
Struthers,O. Y1	7.65
Warren,O. C17	7.65
Waukegan,Ill. A7	7.65
Willimantic,Conn. J5	8.15
Youngstown F3, Y1	7.65

BARS, Cold-Finished Carbon
(Turned and Ground)

Cumberland,Md.(5) C19	6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18	9.025
BeaverFalls,Pa.M12,R2	9.025
Bethlehem,Pa. B2	9.025
Bridgeport,Conn. C32	9.175
Buffalo B5	9.025
Camden,N.J. P13	9.20
Canton,O. T7	9.025
Carnegie,Pa. C12	9.025
Chicago W18	9.025
Cleveland A7, C20	9.025
Detroit B5, P17	9.225
Detroit S41	9.025
Donora,Pa. A7	9.025
Elyria,O. W8	9.025
FranklinPark,Ill. N5	9.025
Gary,Ind. R2	9.025
GreenBay,Wis. F7	9.025
Hammond,Ind. J5, L2	9.025
Hartford,Conn. R2	9.325
Harvey,Ill. R5	9.025
Lackawanna,N.Y. B3	9.025
LosAngeles P2, S30	11.00
Mansfield,Mass. B5	9.325
Massillon,O. R2, R8	9.025
Midland,Pa. C18	9.025
Monaca,Pa. S17	9.025
Newark,N.J. W18	9.20
Plymouth,Mich. P5	9.225
S.Chicago,Ill. W14	9.025
SpringCity,Pa. K3	9.20
Struthers,O. Y1	9.025

Warren,O. C17	9.025
Waukegan,Ill. A7	9.025
Willimantic,Conn. J5	9.325
Worcester,Mass. A7	9.325
Youngstown F3, Y1	9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2	5.675
Atlanta A11	5.25
Birmingham C15	5.25
Buffalo R2	5.675
Cleveland R2	5.675
Ecorse,Mich. G5	5.675
Emeryville,Calif. J7	6.425
Fairfield,Ala. T2	5.675
Fairless,Pa. U5	5.825
Fontana,Calif. K1	6.375
Ft.Worth,Tex.(26) T4	5.50
Gary,Ind. U5	5.675
Houston S5	5.675
Ind.Harbor,Ind. I-2,Y1	5.675
Johnstown,Pa. B2	5.675
Joliet,Ill. P22	5.675
KansasCity,Mo. S5	5.675
Kokomo,Ind. C16	5.775
Lackawanna,N.Y. B2	5.675
LosAngeles B3	6.375
Madison,Ill. L1	5.875
Milton,Pa. M18	5.825
Minnequa,Colo. C10	6.125
Niles,Calif. P1	6.375
Pittsburg,Calif. C11	6.375
Pittsburgh J5	5.675
Portland,Oreg. O4	6.425
SandSprings,Okla. S5	5.675
Seattle A24, B3, N14	6.425
S.Chicago,Ill. R2, W14	5.675
S.Duquesne,Pa. U5	5.675
S.SanFrancisco B3	6.425
SparrowsPoint,Md. B2	5.675
Sterling,Ill.(1) N15	5.675
Sterling,Ill. N15	5.775
Struthers,O. Y1	5.675
Tonawanda,N.Y. B12	6.10
Torrance,Calif. C11	6.375
Youngstown R2, U5	5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2	7.42
Boston B2, U8	8.15
Chicago U8	7.41
Cleveland U8	7.39
Houston S5	7.35
Johnstown,Pa. B2	7.33
KansasCity,Mo. S5	7.35
Lackawanna,N.Y. B2	7.35
Marion,O. P11	6.70
Newark,N.J. U8	7.80
Philadelphia U8	7.63
Pittsburgh J5, U8	7.35
SandSprings,Okla. S5	7.35
Seattle A24, B3, N14	7.95
SparrowsPt.,Md. B2	7.33
St.Paul U8	8.17
Williamsport,Pa. S19	7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14	15.10
Economy,Pa.(D.R.)B14	19.30
Econ.(DirectRolled)B14	13.55
Economy(Staybolt)B14	19.80
McK.Rks.(S.R.) L5	14.50
McK.Rks.(D.R.) L5	19.80
McK.Rks.(Staybolt)L5	20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2	5.575
ChicagoHts.(4)(44) I-2	5.675
ChicagoHts.(4) C2	5.675
Franklin,Pa.(3) F5	5.575
Franklin,Pa.(4) F5	5.675
JerseyShore,Pa.(3) J8	5.55
Marion,O.(3) P11	5.575
Tonawanda(3) B12	5.575
Tonawanda(4) B12	6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2	5.10
Allenport,Pa. P7	5.10
Aliquippa,Pa. J5	5.10
Ashland,Ky.(8) A10	5.10
Cleveland J5, R2	5.10
Conshohocken,Pa. A3	5.15
Detroit(8) M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Fairless,Pa. U5	5.15
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Geneva,Utah C11	5.20
GraniteCity,Ill.(8) G4	5.20
Ind.Harbor,Ind. I-2, Y1	5.10
Irvin,Pa. U5	5.10
Lackawanna,N.Y. B2	5.10
Mansfield,O. E6	5.10
Munhall,Pa. U5	5.10
Newport,Ky. A2	5.10
Niles,O. M21, S3	5.10
Pittsburg,Calif. C11	5.80
Pittsburgh J5	5.10
Portsmouth,O. P12	5.10
Riverdale,Ill. A1	5.10
Sharon,Pa. S3	5.10
S.Chicago,Ill. U5, W14	5.10
SparrowsPoint,Md. B2	5.10
Steubenville,O. W10	5.10
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5, Y1	5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3	6.275

SHEETS, H.R. Alloy

Gary,Ind. U5	8.40
Ind.Harbor,Ind. Y1	8.40
Irvin,Pa. U5	8.40
Munhall,Pa. U5	8.40
Newport,Ky. A2	8.40
Youngstown U5, Y1	8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5	7.525
Ashland,Ky. A10	7.525
Cleveland J5, R2	7.525
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.525
Fairfield,Ala. T2	7.525
Fairless,Pa. U5	7.575
Farrell,Pa. S3	7.525
Fontana,Calif. K1	8.25
Gary,Ind. U5	7.525
Ind.Harbor,Ind. I-2, Y1	7.525
Irvin,Pa. U5	7.525
Lackawanna(35) B2	7.525
Munhall,Pa. U5	7.525
Niles,O. S3	7.525
Pittsburgh J5	7.525
S.Chicago,Ill. U5, W14	7.525
Sharon,Pa. S3	7.525
SparrowsPoint(36) B2	7.525
Warren,O. R2	7.525
Weirton,W.Va. W6	7.525
Youngstown U5, Y1	7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10	5.35
Cleveland R2	5.875
Warren,O. R2	5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	7.05
Middletown,O. A10	6.775
Warren,O. R2	7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2	6.275
Aliquippa,Pa. J5	6.275
Allenport,Pa. P7	6.275
Cleveland J5, R2	6.275
Conshohocken,Pa. A3	6.325
Detroit M1	6.275
Ecorse,Mich. G5	6.275
Fairfield,Ala. T2	6.275
Fairless,Pa. U5	6.325
Follansbee,W.Va. F4	6.275
Fontana,Calif. K1	7.40
Gary,Ind. U5	6.275
GraniteCity,Ill. G4	6.375
Ind.Harbor,Ind. I-2, Y1	6.275
Irvin,Pa. U5	6.275
Lackawanna,N.Y. B2	6.275
Mansfield,O. E6	6.275
Middletown,O. A10	6.275
Newport,Ky. A2	6.275
Pittsburg,Calif. C11	7.225
Pittsburgh J5	6.275
Portsmouth,O. P12	6.275
SparrowsPoint,Md. B2	6.275
Steubenville,O. W10	6.275
Warren,O. R2	6.275
Weirton,W.Va. W6	6.275
Yorkville,O. W10	6.275
Youngstown Y1	6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5	9.275
Cleveland J5, R2	9.275
Ecorse,Mich. G5	9.275
Fairless,Pa. U5	9.325
Fontana,Calif. K1	10.40
Gary,Ind. U5	9.275
Ind.Harbor,Ind. I-2, Y1	9.275
Lackawanna(38) B2	9.275
Pittsburgh J5	9.275
SparrowsPoint(33) B2	9.275
Warren,O. R2	9.275
Weirton,W.Va. W6	9.275
Youngstown Y1	9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill. G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2	7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2	6.875‡
Ashland,Ky. A10	6.875‡
Canton,O. R2	6.875‡
Dover,O. E6	6.875†
Fairfield,Ala. T2	6.875†
Gary,Ind. U5	6.875†
GraniteCity,Ill. G4	6.975*
Ind.Harbor,Ind. I-2	6.875†
Irvin,Pa. U5	6.875†
Kokomo,Ind. C16	6.975‡
MartinsFerry,O. W10	6.875*
Middletown,O. A10	6.875†
Pittsburg,Calif. C11	7.625*
Pittsburgh J5	6.875†
SparrowsPt.,Md. B2	6.875†
Warren,O. R2	6.875†
Weirton,W.Va. W6	6.875*

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*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5	10.125
Pittsburgh J5	10.125
SparrowsPt.(39) B2	10.025

SHEETS, Galvannealed Steel

Canton,O. R2	7.275
Irvin,Pa. U5	7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10	7.125
Middletown,O. A10	7.125

SHEETS, Electrogalvanized

Cleveland(28) R2	7.65
Niles,O.(28) R2	7.65
Weirton,W.Va. W6	7.50
Youngstown J5	7.50

SHEETS, Well Casing

Fontana,Calif. K1	7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1)	9.525
Butler,Pa. A10 (type 2)	9.625
Irvin,Pa. U5 (type 1)	9.525

SHEETS, Enameling

Ashland,Ky. A10	6.775
Cleveland R2	6.775
Fairfield,Ala. T2	6.775
Gary,Ind. U5	6.775
Ind.Harbor,Ind. I-2, Y1	6.775
Irvin,Pa. U5	6.775
Middletown,O. A10	6.775
Niles,O. M21, S3	6.775
SparrowsPoint,Md. B2	6.775
Youngstown Y1	6.775

BLUED STOCK, 29 Gage

Dover,O. E6	8.70
Ind.Harbor,Ind. I-2	8.70
Mansfield,O. E6	8.70
Warren,O. R2	8.70
Yorkville,O. W10	8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10	7.225
Gary,Ind. U5	7.225
Mansfield,O. E6	7.225
Middletown,O. A10	7.225
Niles,O. M21, S3	7.225
Warren,O. R2	7.225
Weirton,W.Va. W6	7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	7.625

Key to Producers

A1	Acme Steel So.
A2	Acme-Newport Steel Co.
A3	Alan Wood Steel Co.
A4	Allegheny Ludlum Steel
A5	Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6	American Shim Steel Co.
A7	American Steel & Wire Div., U. S. Steel Corp.
A8	Anchor Drawn Steel Co.
A9	Angell Nail & Chaplet
A10	Armco Steel Corp.
A11	Atlantic Steel Co.
A24	Alaska Steel Mills Inc.
B1	Babcock & Wilcox
B2	Bethlehem Steel Co.
B3	Bethlehem Steel Co., Pacific Coast Div.
B4	Blair Strip Steel Co.
B5	Bliss & Laughlin Inc.
B8	Braeburn Alloy Steel
B9	Brainard Steel Div., Sharon Steel Corp.
B10	E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12	Buffalo Steel Corp.
B14	A. M. Byers Co.
B15	J. Bishop & Co.
C1	Calstrip Steel Corp.
C2	Calumet Steel Div., Borg-Warner Corp.
C4	Carpenter Steel Co.
C9	Colonial Steel Co.
C10	Colorado Fuel & Iron
C11	Columbia-Geneva Steel
C12	Columbia Steel & Shaft.
C13	Columbia Tool Steel Co.
C14	Compressed Steel Shaft.
C15	Connors Steel Div., H. K. Porter Co., Inc.
C16	Continental Steel Corp.
C17	Copperweld Steel Co.
C18	Crucible Steel Co.
C19	Cumberland Steel Co.
C20	Cuyahoga Steel & Wire
C22	Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23	Charter Wire Inc.
C24	G. O. Carlson Inc.
C32	Carpenter Steel of N.Eng.
D2	Detroit Steel Corp.
D4	Disston Div., H. K. Porter Co. Inc.
D6	Driver-Harris Co.
D7	Dickson Weatherproof Nail Co.
D8	Damascus Tube Co.
D9	Wilbur B. Driver Co.
E1	Eastern Gas&Fuel Assoc.
E2	Eastern Stainless Steel
E6	Empire-Reeves Steel
E10	Enamel Prod. & Plating
F2	Firth Sterling Inc.
F3	Fitzsimmons Steel Co.
F4	Follansbee Steel Corp.
F5	Franklin Steel Div., Borg-Warner Corp.
F6	Fretz-Moon Tube Co.
F7	Ft. Howard Steel & Wire
F8	Ft. Wayne Metals Inc.
G4	Granite City Steel Co.
G5	Great Lakes Steel Corp.
G6	Greer Steel Co.
G8	Green River Steel Corp.
H1	Hanna Furnace Corp.
H7	Helical Tube Co.
I-1	Igoe Bros. Inc.
I-2	Inland Steel Co.
I-3	Interlake Iron Corp.
I-4	Ingersoll Steel Div., Borg-Warner Corp.
I-6	Ivins Steel Tube Works
I-7	Indiana Steel & Wire Co.
J1	Jackson Iron & Steel Co.
J3	Jessop Steel Co.
J4	Johnson Steel & Wire Co.
J5	Jones & Laughlin Steel
J6	Joslyn Mfg. & Supply
J7	Judson Steel Corp.
J8	Jersey Shore Steel Co.
K1	Kaiser Steel Corp.
K2	Keokuk Electro-Metals
K3	Keystone Drawn Steel
K4	Keystone Steel & Wire
K7	Kenmore Metals Corp.
L1	Laclede Steel Co.
L2	LaSalle Steel Co.
L3	Latrobe Steel Co.
L6	Lone Star Steel Co.
L7	Lukens Steel Co.
L8	Leschen Wire Rope Div., H. K. Porter Co. Inc.
M1	McLouth Steel Corp.
M4	Mahoning Valley Steel
M6	Mercer Pipe Div., Sawhill Tubular Products
M8	Mid-States Steel & Wire
M12	Moltrup Steel Products
M14	McInnes Steel Co.
M16	Md. Fine & Specialty Wire Co. Inc.
M17	Metal Forming Corp.
M18	Milton Steel Div. Merritt-Chapman&Scott
M21	Mallory-Sharon Metals Corp.
M22	Mill Strip Products Co.
M23	Mill Strip Products Co. of Pennsylvania
N1	National-Standard Co.
N2	National Supply Co.
N3	National Tube Div., U. S. Steel Corp.
N5	Nelsen Steel & Wire Co.
N6	New England High Carbon Wire Co.
N8	Newman-Crosby Steel
N14	Northwest. Steel Rolling Mills Inc.
N15	Northwestern S.&W. Co.
N20	Neville Ferro Alloy Co.
O4	Oregon Steel Mills
P1	Pacific States Steel Corp.
P2	Pacific Tube Co.
P4	Phoenix Steel Corp.
P5	Pilgrim Drawn Steel
P6	Pittsburgh Coke&Chem.
P7	Pittsburgh Steel Co.
P11	Pollak Steel Co.
P12	Portsmouth Div., Detroit Steel Corp.
P13	Precision Drawn Steel
P15	Pittsburgh Metallurgical
P16	Page Steel & Wire Div., American Chain & Cable
P17	Plymouth Steel Corp.
P19	Pitts. Rolling Mills
P20	Prod. Steel Strip Corp.
P22	Phoenix Mfg. Co.
P24	Phil. Steel & Wire Corp.
R2	Republic Steel Corp.
R3	Rhode Island Steel Corp.
R5	Roebling's Sons, John A.
R6	Rome Strip Steel Co.
R8	Reliance Div.,EatonMfg.
R9	Rome Mfg. Co.
R10	Rodney Metals Inc.
S1	Seneca Wire & Mfg. Co.
S3	Sharon Steel Corp.
S4	Sharon Tube Co.
S5	Sheffield Div., Armco Steel Corp.
S6	Shenango Furnace Co.
S7	Simmons Co.
S8	Simonds Saw & Steel Co.
S12	Spencer Wire Corp.
S13	Standard Forgings Corp.
S14	Standard Tube Co.
S15	Stanley Works
S17	Superior Drawn Steel Co.
S18	Superior Steel Div., Copperweld Steel Co.
S19	Sweet's Steel Co.
S20	Southern States Steel
S23	Superior Tube Co.
S25	Stainless Welded Prod.
S26	Specialty Wire Co. Inc.
S30	Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40	Seneca Steel Service
S41	Stainless & Strip Div., J & L Steel Corp.
S42	Southern Elec. Steel Co.
S43	Seymour Mfg. Co.
S44	Screw & Bolt Corp. of America
S45	Somers Brass Co.
T2	Tenn. Coal & Iron Div., U. S. Steel Corp.
T3	Tenn. Products & Chemical Corp.
T4	Texas Steel Co.
T5	Thomas Strip Div., Pittsburgh Wire Co.
T6	Thompson Wire Co.
T7	Timken Roller Bearing
T9	Tonawanda Iron Div., Am. Rad. & Stan. San.
T13	Tube Methods Inc.
T19	Techalloy Co. Inc.
U3	Union Wire Rope Corp.
U4	Universal-Cyclops Steel
U5	U. S. Steel Corp.
U6	U. S. Pipe & Foundry
U7	Ulbrich Stainless Steels
U8	U. S. Steel Supply Div., U. S. Steel Corp.
U11	Union Carbide Metals Co.
U13	Union Steel Corp.
V2	Vanadium-Alloys Steel
V3	Vulcan-Kidd Steel Div., H. K. Porter Co.
W1	Wallace Barnes Steel Div., Associated Spring
W2	Wallingford Steel Co.
W3	Washburn Wire Co.
W4	Washington Steel Corp.
W6	Weirton Steel Co.
W8	Western Automatic Machine Screw Co.
W9	Wheatland Tube Co.
W10	Wheeling Steel Corp.
W12	Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13	Wilson Steel & Wire Co.
W14	Wisconsin Steel Div., International Harvester
W15	Woodward Iron Co.
W18	Wyckoff Steel Co.
Y1	Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.525
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.525
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M23	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale,Ill. A1	7.525
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Cleveland A7	15.55
Carnegie,Pa. S18	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. N8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.10	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.10	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	...	18.85	22.95	27.80
Buffalo W12	...	...	18.85	....	....
Fostoria,O. S1	...	...	19.05	22.15	....
FranklinPark,Ill. T6	...	...	19.20	23.30	28.15
Harrison,N.J. C18	...	...	18.85	22.95	27.80
NewYork W3	...	...	18.85	22.95	27.80
Palmer,Mass. W12	...	...	18.85	....	....
Trenton,N.J. R5	...	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	...	18.85	22.95	27.80
Youngstown S41	...	...	19.20	23.30	28.15

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M23	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41, Y1	7.425*

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*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9 35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (FERROLITE) (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield, Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

Vandergrift,Pa. U5	8.10
Mansfield,O. E6	8.10
Warren,O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented					
	T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

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*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
Rankin,Pa. A7	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	13.40
KansasCity,Mo. U3	12.90
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md. B2	13.50
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.05
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.70
Millbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass. A7, J4, T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

ROPE WIRE	(A)
Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S1	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St. Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer, Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va., W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box)

Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85-19.40†	
Worcester A7	18.15	.....

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes: for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

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*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packages	43.75
Bulk	50

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16

Flat Head Cap Screws:

⅜ in. and smaller, 6 in. and shorter:

Packages	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:

Packages	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packages	+20

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

$\frac{7}{16}$ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27 24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

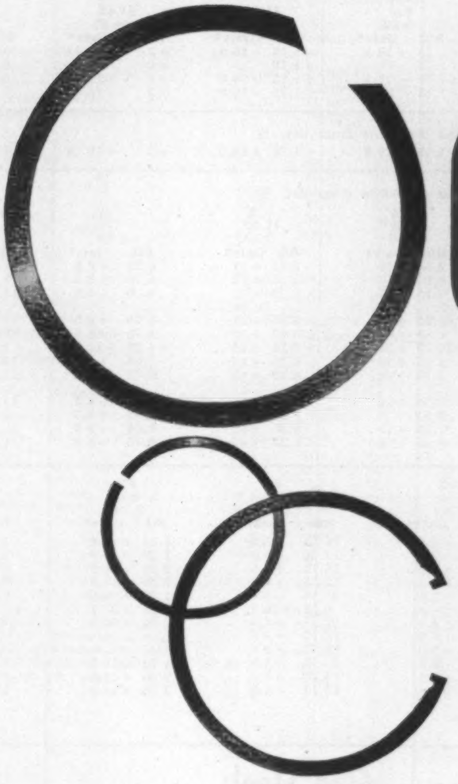
Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.



QUALITY RINGS TRUE

Snap rings are one of the most elementary of fasteners — yet are called upon to play vital roles in the assembly of thousands of products. This is why there can be no sacrifice of quality when you specify snap, bearing, lock or retainer rings for your products. For unless the rings you specify do their job well — literally hold your products together — the result can only be loss of customer satisfaction. Your best assurance of quality is the reputation of the company who supplies your rings. Eaton's Reliance Division handles every step in the fabrication of rings from the cold finishing of the spring-quality steel through the forming, heat treating and finishing. Every step is guarded by an exacting quality control program that leaves no stone unturned to assure that your specifications are held completely. In addition to custom rings, Reliance produces an extensive line of standard rings for most standard ring applications. Write for engineering specifications.

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SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

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*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	30.00	42.25	44.50	40.00	40.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	39.50	43.75	44.25	46.75	45.75	52.00	52.00
304L	....	....	47.25	51.50	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	31.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	—Plates— Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.80	44.20

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*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

—Grade by Analysis (%)— W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Minimum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R3	66.00	66.50	67.00	67.50
N.Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago R3	66.00	66.50	66.50	67.00
S.Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa. deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30

	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67 00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75 50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

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*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon, add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max).	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL SHAPES	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140		Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.27	8.66	10.06	....	8.28	8.95	11.80	16.38	9.53	8.84	10.43
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.98	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.43	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	10.03	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.13	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.59	11.29	12.20	61.27	11.29	9.67	14.20	17.35	10.54	9.82	11.79
Memphis, Tenn.	9.84	10.05	....	....	11.24	9.92	12.74	....	10.33	10.12	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	9.24	10.70	11.45	....	10.90	9.34	11.15	16.45	9.83	9.17	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.85	10.00	10.89	52.71	10.85	9.25	11.95	16.38	9.45	9.20	10.45
Pittsburgh	8.57	9.98	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	10.20	12.05	12.35	....	12.20	10.20	16.65	17.80	10.80	10.35	12.50
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.45	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. x 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2¾ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $168; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.
60 *Per cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.
70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore, $73.

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*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon, Forging Quality (net ton)	$97.00
Alloy (net ton)	115.00
Wire Rods:	
Carbon 1/32" to under ¼ in.	5.30
Carbon, ¼ in. to 47/64 in.	5.70
Alloy	6.40
Wire (Carload lots)	8.40
Bars & Small Shapes:	
Carbon, merchant quality	5.40
Carbon, special quality	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Structural Size Angles & Zees	5.40
Plates:	
Carbon	5.45
Sheets & Coils, Hot Rolled:	
Carbon Sheets	5.00
Carbon Strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon Sheets	6.35
Carbon Strip (0.080 and lighter)	6.35
Carbon Strip (0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard Quality	6.70
Culvert Quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field Grade	9.00
Armature Grade	9.50
Electrical Grade	10.15
Tin Mill ....(Per Base Box; **Products** 100 lb basis wt)	
Coke Tin Plate (1.25 lb pot yield)	$10.60
Electrolytic Tin Plate (0.25 lb coating)	9.10
Black Plate	8.30
Nails, c.l. lots ....(per keg)	
400 keg min.	$8.15

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted).

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe	36.75, ton, del. east of Mississippi.
Unannealed (99+ % Fe)	33.0
Unannealed (99+ % Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots 41.80	
Brass, 80/20, leaded (60 mesh)	39.90
Bronze, filter powder, 90/10	47.00*
Cobalt, 50 mesh	1.58
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	60.70
Solder	15.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	25.90
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten:	Dollars
Carbon and hydrogen reduced, 98.8% min., minus 65 mesh	nom.**
Molybdenum	4.35

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*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West C ast
Deformed Bars, Intermediate, ASTM-A 305	$5.65	....	$5.55	$5.40	$5.75
Bar Size Angles	5.85	....	5.75	5.60	5.95
Structural Angles	5.65	....	5.55	5.40	5.75
I-Beams	5.60	....	5.50	5.35	5.70
Channels	5.60	....	5.50	5.35	5.70
Plates (basic bessemer)	5.85	....	5.75	5.60	5.95
Sheets, H.R.	Nom.	....	Nom.	Nom.	Nom.
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	Nom.	....	Nom.	Nom.	Nom.
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.70	....	24.85	24.85	26.02
Barbed Wire (†)	6.15	....	6.05	5.90	6.25
Merchant Bars	5.85	....	5.75	5.60	5.95
Hot-Rolled Bands	6.20	....	6.10	5.95	6.30
Wire Rods, Thomas Commercial No. 5	6.40	....	6.20	6.20	6.60
Wire Rods, O. H., No. 5	6.55	....	6.35	6.35	6.70
Bright Common Wire Nails (§)	7.30	....	7.20	7.05	7.40

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*Books closed for 1960-61 shipping season. †Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump, ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.75-20.00
Domestic, concentrates, f.o.b. milling points	22.00-23.00

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*Before duty. †Nominal.

Manganese Ore

Mn 46-58%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian	
48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†
South African Transvaal	
44% no ratio	18.75†
48% no ratio	24.00-26.00†
Turkish	
48% 3:1	36.00-37.00†
Domestic	
Rail nearest seller	
18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

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†Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens	
Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50
Oven Foundry	
Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

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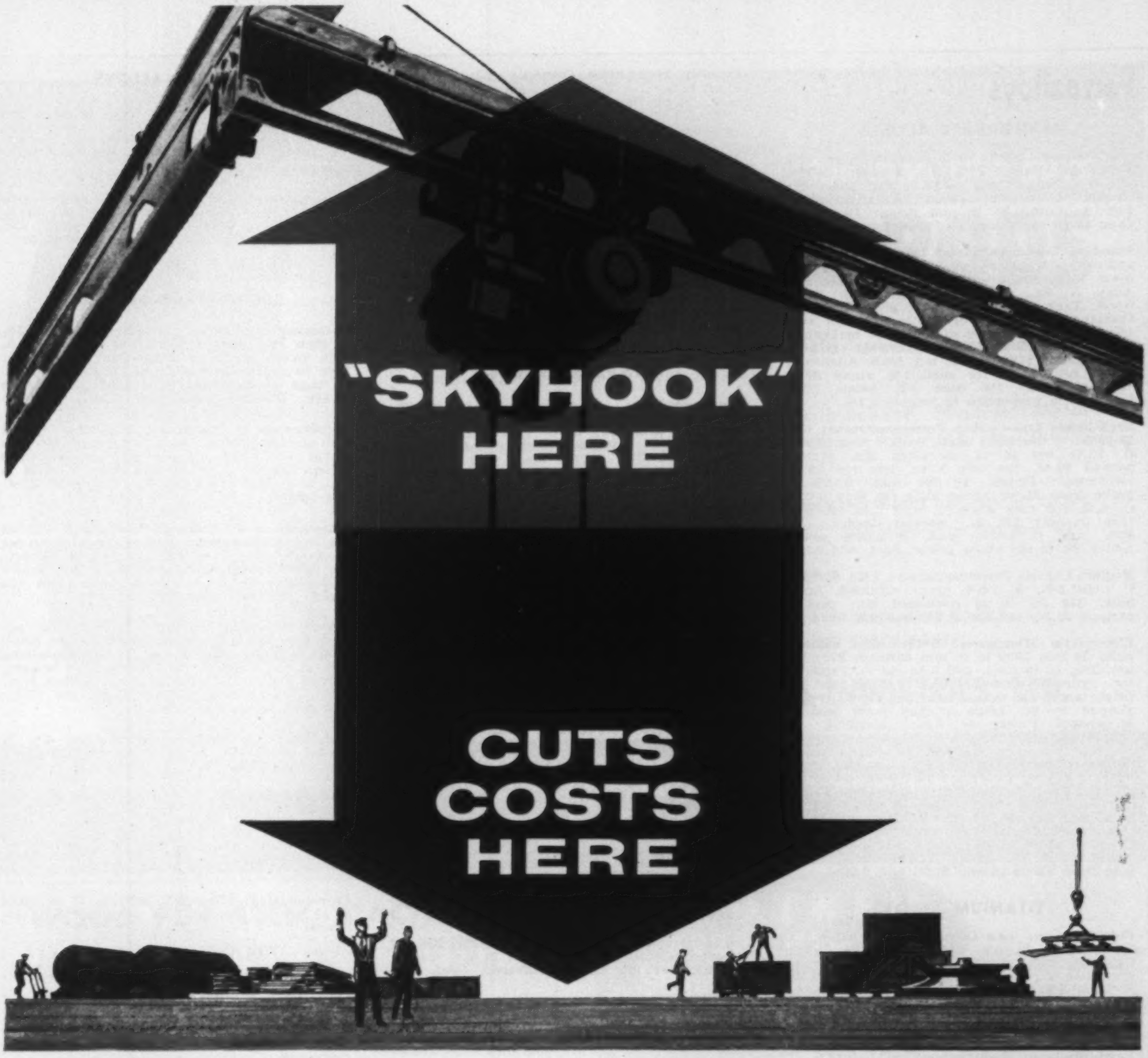
*Within $5 15 freight zone from works.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00



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Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50. 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-70%, C 7% approx) base price per net ton, $220. Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va., Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%. fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5-8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 53-63%, C 3-5%, Si 2.5% max., 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max. 33.50c per lb contained Cr.; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr: 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3⅜ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained. f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (CB 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

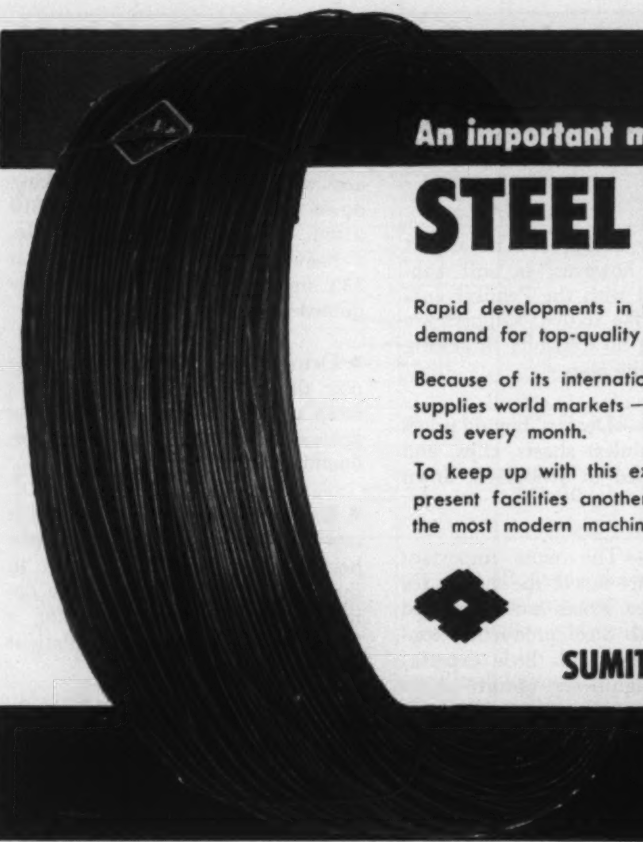
V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.



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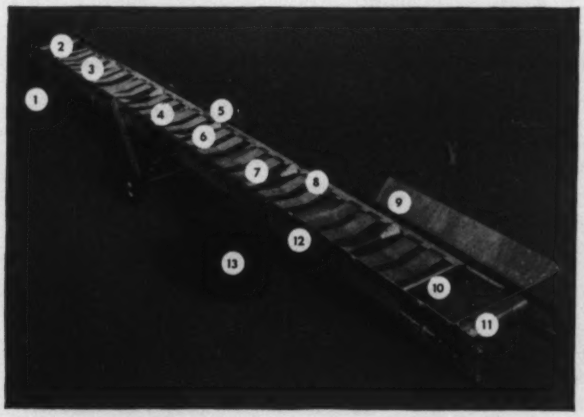

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- ❽ Wear strip
- ❾ Alloy hopper 4′-0″ long
- ❿ Clean out opening and scraper
- ⓫ Head and crowned tail pulley
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- ⓭ Belt rubber covered

Scrapmen Await Buying Pickup

STEEL's composite on No. 1 heavy melting grade holds unchanged at $32.33 for second straight week, but thorough test is lacking at most market centers

Scrap Prices, Page 222

- **Pittsburgh**—Except for a couple of small purchases of No. 2 bundles by two district mills at $26, there hasn't been much activity in this market. Chief reason: The railroad labor situation in this area. However, scrap supply in relation to steelmaking operations (under 50 per cent of capacity) was adequate before the rail strikes intensified the slackness in the area.

One railroad offering last week, that by the New York Central, brought $35 for No. 1 R.R. heavy melting. A Pennsylvania list was withdrawn temporarily, but a B&O list closed at about the same level as the NYC list.

- **Philadelphia** — Prices are unchanged. Domestic demand continues slow, and there are few signs of an early pickup. The export movement, however, is still substantial, and with the Pennsylvania Railroad strike settled, shippers are experiencing no difficulty in getting material to the piers.

- **New York**—Dealers' buying prices on 18-8 stainless sheets, clips, and solids dropped to $160-$165, down $5.

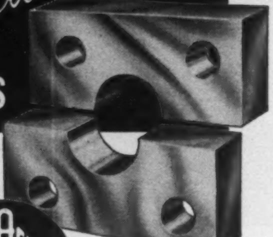
- **Chicago** — The most important consumers are out of the market for dealer grades. Prices are unchanged but nominal. Steel production continues to drag with little expectation of a significant upturn before next month.

- **Cleveland** — The market continues in the doldrums, with purchases by steel mills and foundries limited to small lots. A recent purchase of cut foundry steel by a local consumer confirmed the price ($34-$35) quoted on that grade for several weeks. Stainless scrap prices are weaker; brokers are marking down their buying prices $5 to $10 a ton. In the Valley, railroad No. 1 heavy melting steel has sold at $35, up 50 cents from the recently quoted level.

- **Detroit**—Brokers and dealers report the mills are holding surplus scrap stocks. More material is being generated through rising auto production.

- **Buffalo**—Fair export tonnage is moving from this area, a factor helping to support the market in the absence of strong domestic demand. Dealers are channeling a fair amount of their accumulations to the European market.

- **Cincinnati**—Limited tonnage is being purchased by a local mill. Some light buying by the foundries is also noted. Quotations are nom-



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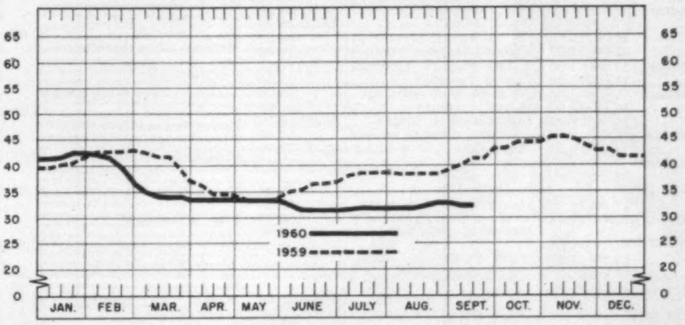
STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL



Sept. 14 1960	Week Ago	Month Ago	Year Ago	August Avg.
$32.33	$32.33	$32.33	$41.00	$32.33

inal, with No. 1 heavy melting at $26.50-$27.50. Two railroad grades are quoted off $1 a ton on small buying.

• **St. Louis**—Both local mills have been out of the market the last several days, and prices on most open hearth grades of scrap are off $1 to $3 a ton. No. 1 cupola cast is also off, being down $2 to $41, with clean auto cast now quoted at $42, angles and splice bars $39.

• **Birmingham**—Brokers report No. 1 heavy melting is quoted $30-$31, machine shop turnings $17-$18, shoveling turnings $19-$20, bar crops and plate $38-$39, electric furnace scrap (3 ft. and under) $33-$34, No. 1 cupola cast $47-$48, stove plate $47-$48, and No. 1 railroad heavy melting $34-$35.

The latter grade is still quoted $31-$32 in Birmingham, but it brought $34-$35 at another point in the area.

• **Houston**—Domestic scrap prices are holding at levels established early this month when a major area mill placed a moderate order. Export prices are $1 to $2 above the domestic level, but they are not too strongly supported by new demand.

• **San Francisco**—With the major steel mills still out of the market, scrap continues to move at a sluggish pace. Exports provide the chief activity, absorbing what new tonnage is appearing on the market.

• **Los Angeles** — Negotiations between area scrap dealers and Japanese buyers continue to drag on into the third week. The Japanese are reported demanding a $2-$3 reduction of the stevedoring allowance per ton.

• **Portland, Oreg.** — The leading local buyer is reported to have set

(Please turn to Page 227)

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Sept. 14, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Sept. 14	$32.33
Sept. 7	32.33
Aug. Avg.	32.33
Sept. 1959	41.25
Sept. 1955	44.42

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting...	30.00-31.00
No. 2 heavy melting...	26.00-27.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	25.00-26.00
No. 1 busheling	30.00-31.00
No. 1 factory bundles	38.00-39.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short turnings	20.00-21.00
Cast iron borings	19.00-20.00
Cut structurals:	
2 ft and under	37.00-38.00
3 ft and under	36.00-37.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	39.00-40.00
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Stove plate	34.00-35.00
Unstripped motor blocks	25.00-26.00
Clean auto cast	37.00-38.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	*35.00-36.00*
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	46.00-47.00
Angles, splice bars	45.00-46.00
Railroad specialties	*45.00-46.00*
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	32.00-33.00
No. 1 hvy melt., dealer	30.00-31.00
No. 2 hvy melting	28.00-29.00
No. 1 factory bundles	37.00-38.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	20.00-21.00
No. 1 busheling, indus.	32.00-33.00
No. 1 busheling, dealer	30.00-31.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	16.00-17.00
Shovel turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut structurals, 3 ft	34.00-35.00
Punchings & plate scrap	37.00-38.00

Cast Iron Grades

No. 1 cupola	40.00-41.00
Stove plate	*34.00-35.00*
Unstripped motor blocks	32.00-33.00
Clean auto cast	45.00-46.00
Drop broken machinery	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
R.R. malleable	44.00-45.00
Rails, 2 ft and under	47.00-48.00
Rails, 18 in. and under	48.00-49.00
Angles, splice bars	41.00-42.00
Axles	53.00-54.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles, solids	175.00-180.00
18-8 turnings	90.00-95.00
430 bundles & solids	85.00-90.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting...	23.00-24.00
No. 2 heavy melting...	15.00-16.00
No. 1 bundles	26.00-27.00
No. 2 bundles	14.00-15.00
No. 1 busheling	22.00-23.00
Machine shop turnings	8.00-9.00
Mixed borings, turnings	10.00-11.00
Shovel turnings	11.00-12.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Stove plate	27.00-28.00
Heavy breakable	27.00-28.00
Unstripped motor blocks	19.00-20.00
Charging box cast	27.00-28.00
Clean auto cast	42.00-43.00

CLEVELAND

No. 1 heavy melting...	31.00-32.00
No. 2 heavy melting...	23.00-24.00
No. 1 factory bundles	33.50-34.50
No. 1 bundles	31.00-32.00
No. 2 bundles	17.00-18.00
No. 1 busheling	31.00-32.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	34.00-35.00
Cut structurals, plate 2 ft and under	37.00-38.00
Low phos. punchings & plate	31.00-32.00
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	33.00-34.00†

Cast Iron Grades

No. 1 cupola	44.00-45.00
Charging box cast	33.00-34.00
Heavy breakable cast	30.00-31.00
Stove plate	39.00-40.00
Unstripped motor blocks	32.00-33.00
Brake shoes	35.00-36.00
Clean auto cast	50.00-51.00
Burnt cast	40.00-41.00
Drop broken machinery	50.00-51.00

Railroad Scrap

R.R. malleable	45.00-46.00
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Rails, random length	44.00-45.00
Cast steel	38.00-39.00
No. 1 railroad cast	46.00-47.00
Railroad specialties	44.00-45.00
Angles, splice bars	46.00-47.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	*165.00-170.00*
18-8 turnings	75.00-80.00
430 clips, bundles, solids	*85.00-90.00*
430 turnings	20.00-30.00†

YOUNGSTOWN

No. 1 heavy melting...	33.00-34.00
No. 2 heavy melting...	25.00-26.00
No. 1 busheling	33.00-34.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	35.00-36.00
Electric furnace bundles	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt.	*35.00-36.00*

BUFFALO

No. 1 heavy melting...	29.00-30.00
No. 2 heavy melting...	24.00-25.00†
No. 1 bundles	29.00-30.00
No. 2 bundles	21.00-22.00
No. 1 busheling	29.00-30.00
Shovel turnings	16.00-17.00
Machine shop turnings	12.00-13.00
Cast iron borings	14.00-15.00
Low phos. structurals and plate, 2 ft and under	37.00-38.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	40.00-41.00
No. 1 machinery	47.00-48.00

Railroad Scrap

Rails, random lengths	41.00-42.00
Rails, 3 ft and under	47.00-48.00
Railroad specialties	40.00-41.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting...	26.50-27.50
No. 2 heavy melting...	22.50-23.50
No. 1 bundles	26.50-27.50
No. 2 bundles	17.50-18.50
No. 1 busheling	26.50-27.50
Machine shop turnings	*9.00-10.00*
Mixed borings, turnings	*9.00-10.00*
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Low phos. 18 in.	35.00-36.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable cast	31.00-32.00
Charging box cast	35.00-36.00
Drop broken machinery	48.00-49.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	*50.00-51.00*
Rails, random lengths	*42.00-43.00*

PHILADELPHIA

No. 1 heavy melting...	35.00
No. 2 heavy melting...	31.00
No. 1 bundles	36.00
No. 2 bundles	24.00-25.00
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	17.00†
Shovel turnings	21.00
Machine shop turnings	15.00
Heavy turnings	28.00†
Structurals & plates	38.00-40.00
Couplers, springs, wheels	40.00
Rail crops, 2 ft & under	51.00-52.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	40.00
Drop broken machinery	50.00
Malleable	46.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting...	31.00-32.00
No. 2 heavy melting...	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	7.00-8.00†
Mixed borings, turnings	8.00-9.00†
Shovel turnings	9.00-10.00†
Low phos. structurals & plates	38.00-39.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	30.00-31.00

Stainless Steel

18-8 sheets, clips, solids	*160.00-165.00*
18-8 borings, turnings	80.00-85.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	70.00-75.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting...	26.00-27.00
No. 2 heavy melting...	20.00-21.00
No. 1 bundles	26.00-27.00
No. 1 busheling	26.00-27.00
Machine shop turnings	6.00-7.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting...	24.00-25.00
No. 1 bundles	29.00-30.00
No. 2 bundles	20.00-21.00
No. 1 busheling	31.00-32.00
Cast iron borings	10.00-11.00
Machine shop turnings	*17.00-18.00*
Shovel turnings	*19.00-20.00*
Bar crops and plate	*38.00-39.00*
Structurals & plate	37.00-38.00
Electric furnace bundles	32.00-33.00
Electric furnace:	
3 ft and under	*33.00-34.00*
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	*47.00-48.00*
Stove plate	*47.00-48.00*
Unstripped motor blocks	35.00-36.00
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00-35.00*
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	39.00-40.00
Angles, splice bars	39.00-40.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*29.00*
No. 2 heavy melting	*27.00*
No. 1 bundles	*31.00*
No. 2 bundles	19.00
No. 1 busheling	*30.00*
Machine shop turnings	*7.50*
Shovel turnings	*9.50*

Cast Iron Grades

No. 1 cupola	*41.00*
Charging box cast	36.00
Heavy breakable cast	34.00
Unstripped motor blocks	36.00
Clean auto cast	*42.00*
Stove plate	37.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00
Rails, random lengths	37.00
Rails, rerolling	51.00
Rails, 18 in. and under	41.00
Angles, splice bars	*39.00*

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting...	34.00
No. 2 heavy melting...	31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	nom.
Low phos. plate & structurals	37.00

Cast Iron Grades

No. 1 cupola	34.00-34.50
Heavy breakable	25.00
Foundry malleable	31.00†
Unstripped motor blocks	28.00-28.50

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00

LOS ANGELES

No. 1 heavy melting	*32.00-35.00*
No. 2 heavy melting	*29.00*
No. 1 bundles	*27.00-34.00*
No. 2 bundles	*17.00-22.00*
Machine shop turnings	*13.00-17.00*
Shovel turnings	*15.00-17.00*
Cast iron borings	*15.00-17.00*
Cut structurals and plate 1 ft and under	*44.00*

Cast Iron Grades

No. 1 cupola	*39.00-44.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00*

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	*36.00-39.00*
No. 2 heavy melting	*33.00-36.00*
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable	33.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting...	38.50
No. 2 (prepared for shears)	30.00
No. 1 hvy (unprepared)	35 00
No. 2 heavy melting...	35.50
No. 2 hvy (unprepared)	33.00
No. 1 (prepared for shears)	33.00
No. 2 bundles	23.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	36.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting...	34.00
No. 2 heavy melting...	30.00
No. 1 bundles	30.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting...	25.80
No. 2 hvy melt, 2 ft & under	25.50
No. 1 bundles	25.80
No. 2 bundles	19.00
Mixexd steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

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†Nominal.

‡F.o.b. Hamilton, Ont.

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We Have Plenty of Cobalt

Despite troubles abroad, supplies are more than adequate. Zinc sales are improving but still slow. Custom copper price should hold for present. Diecasters see good year

Nonferrous Metal Prices, Pages 226 & 227

COBALT SUPPLIES are more than adequate despite chaotic conditions in the Belgian Congo (which produces over 50 per cent of the Free World supply) and Castro's seizure of Freeport Sulphur Co.'s Cuban facility (which has a capacity of 2000 tons a year).

That evaluation was made by Dr. F. R. Morral, Battelle Memorial Institute, Columbus, Ohio. He makes these points: 1. Next year, the Free World will have a production capacity of 25,000 tons a year vs. production of 17,750 tons in 1959. 2. U. S. capacity is more than 4000 tons yearly, Canada around 2000 tons. Together, they could produce enough to supply North America's present consumption requirements. 3. The U. S. government's Defense Production Act inventory is big; the metal could be released to industry if there is a critical shortage. 4. Large stocks of material are in the hands of major producers.

Emphasizes Dr. Morral: "Even if the worst imaginable world events should cause cobalt production to drop drastically for the next few years, we have an abundant supply of this metal in surplus stocks and stockpiles to feed industry at its present rate." Also, plants now closed in the U. S. and Canada could be reactivated.

- **Little Growth Seen**—U. S. cobalt consumption has been on a plateau since the mid-1950s. This year, look for domestic consumption to hit around 5000 tons, about the same as last year. The short term trend: Little upturn in over-all demand, says Dr. Morral.

Over the long pull, hopes are being pinned on a world-wide effort to find new uses.

Domestic production is still depressed because the metal can be imported more cheaply than it can be produced here.

Sees '60 Diecasting Gain

The diecasting industry hasn't given up hope that 1960 will top 1959 despite a heretofore disappointing year. Forecasts the American Die Casting Institute Inc.: 1960 production may hit 335,000 tons (up 10,000 tons from 1959) for zinc and 193,500 tons (up 6000 tons) for aluminum—"a new high for aluminum diecasting output."

Qualifies ADCI: The forecast is based on a substantial gain in passenger car and appliance production in the fourth quarter.

- **Banner Year In '61**—Consumption of diecastings by the auto industry is due for a sharp increase next year, believes the association. Reasons: Applications adopted for the '61 models, plus the introduction of the de luxe models of the compact cars. Predicts ADCI: If 6 million passenger cars are produced in 1961, zinc diecasting production will come close to matching the record set in 1955, and aluminum diecasting production will hit another new high.

Zinc Sales Still Lag

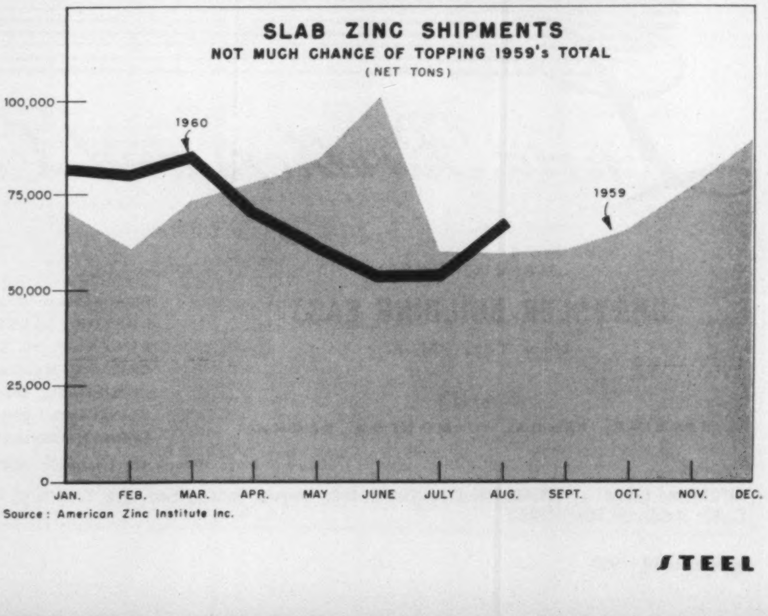
The long awaited spurt in zinc sales hasn't materialized, and producers have no evidence that the next few weeks will bring anything better than a modest improvement in business. It's highly unlikely now that 1960 will be as good a year for zinc as 1959 was (see chart).

- **Prices Stable**—There's little likelihood of a price drop in zinc in the foreseeable future, particularly in view of reduced U. S. output.

Copper's Weak

Foreign political and labor uncertainty is acting as a prop on the U. S. custom smelter copper price.

Continued weak sales hardly justify the present 33 cent a pound quotation, particularly in view of lower foreign prices which allowed dealers in New York last week to sell for around 30 cents a pound. But turmoil in the Congo and the strong possibility that a strike will shut down the Anaconda Co.'s giant Chuquicamata mine in Chile on Oct. 1 will probably combine to keep the price stable for the present.



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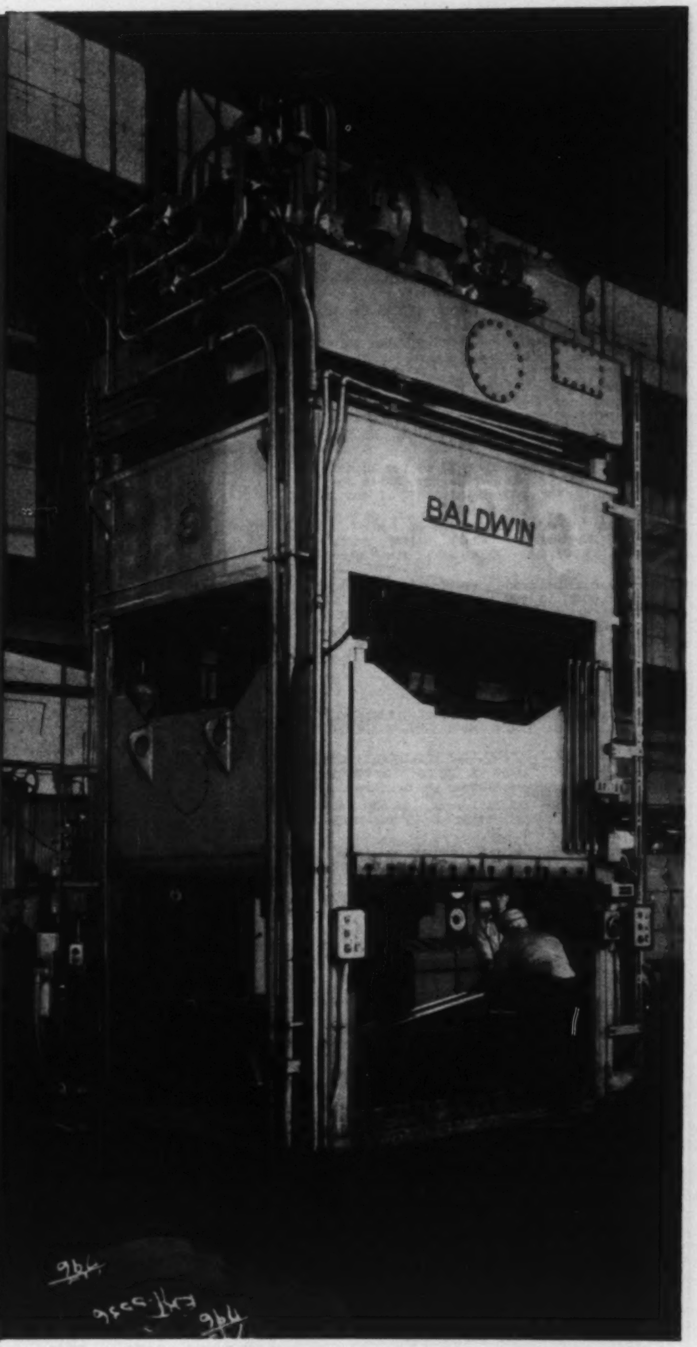

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80. 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.50-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 102.25.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.35-4.50.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.35; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 26.25-28.00; No. 12 foundry alloy (No. 2 grade), 23.75-24.25; 5% silicon alloy, 0.60 Cu max., 25.00-25.25; 13 alloy, 0.60 Cu max., 25.00-25.25; 195 alloy, 26.75-27.75; 108 alloy, 24.25-24.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.00; grade 2, 23.75; grade 3, 22.75; grade 4, 22.25.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R. .	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

---

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

---

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90 60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire 23.00-23.50; No. 2 heavy copper and wire, 20.00-20.50; light copper, 18.00-18.50; No. 1 composition red brass, 17.00-17.25; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 33.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	57.13b	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	58.86	52.21	62.69	....	20.750	20.500	20.000
Muntz Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48.68	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	13.437
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.00-15.75; new brass clippings, 14.00-14.50; light brass, 10.50-10.75; heavy yellow brass, 11.50-11.75; new brass rod ends, 12.00-12.75; auto radiators, unsweated, 12.50-12.75; cocks and faucets, 13.50-14.00; brass pipe, 14.00-14.50.

Lead: Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets, 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 6.50-7.00; segregated low copper clips, 14.00-14.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 11.50-12.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 16 00-16.50; segregated high copper clips, 14.50-15.00; mixed low copper clips, 13.50-14.00; mixed high copper clips, 13.00-13.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00-11.25; clean borings and turnings, 9.50-10.00; segregated low copper clips, 14.75-15.00; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 25.00; light copper, 23.25; refinery brass (60% copper) dry copper content, 23.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 25.00; light copper, 23.25; No. 1 composition borings, 20.50; No. 1 composition solids, 21.00; heavy yellow brass solids, 16.50; yellow brass turnings, 15.50; radiators, 17.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.
Copper: Flat-rolled, 50.04; oval, 46.50, 5000-10,000 lb, electrodeposited, 42.00, 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 121.50; 200-499 lb, 120.00; 500-999 lb, 119.50; 1000 lb or more, 119.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.50 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10.000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 80.10; 100-600 lb, 70.70; 700-1900 lb, 68.00; 2000-9900 lb, 66.10; 10,000 lb or more, 64.80.

Stannous Chloride (Anhydrous): 25 lb, 155.60; 100 lb, 150.70; 400 lb, 148.30; 800-19,900 lb, 107.40; 20,000 lb or more, 101.30.

Stannous Sulphate: Less than 50 lb, 140.70; 50 lb, 110.70; 100-1900 lb, 108.70; 2000 lb or more, 106.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb. 57.00.

(*Concluded from Page* 221)

market prices at $36 to $39 for No. 1 scrap from out of town, $33 to $36 for No. 1 material delivered to dealers' yards.

Export interests are active, this section giving the market a firmer tone.

● Seattle — Conditions are unchanged in this market, but prices in the area are the highest prevailing on the Pacific Coast. The reason: Exports. Three full cargoes are scheduled for shipment to Japan from Seattle and Tacoma this month.

July Steel Shipments Top Those in Like 1959 Month

Direct mill shipments of finished steel products in July totaled 4,710,565 net tons, reports the American Iron & Steel Institute. In June, the total was 5,920,860 tons.

Principal products shipped in July were: Cold rolled sheets (977,179 tons); electrolytic tin plate (489,080 tons); hot rolled sheets (440,305 tons); hot rolled bars, including light shapes (361,702 tons); plates (353,958 tons).

Shipments in the first seven months this year amounted to 47,569,952 net tons, a decline of 9.1 per cent from the 52,333,600 tons moved in the same period of 1959.

The principal markets for finished steel products in July were: Warehouses (817,522 tons); automotive (810,807 tons); construction (740,313 tons); containers (570,615 tons); contractors' products (250,944 tons).

Demand for Import Steel Continues to Slow Down

Imports of European steel have eased. Although there is fair activity in pipe, wire, and some specialties, plates, shapes, and merchant bars are coming in slowly. Imports of deformed bars and sheets are at a virtual standstill.

Export demand for cold rolled sheets, which has been fairly substantial in recent weeks, appears to be leveling off.

Importers are promising deliveries of 45 to 60 days on most products, and they have closed their books on shipments to Great Lakes ports until next spring.

CLASSIFIED

IF YOU OPERATE A FURNACE . . . . .

We will purchase your scrap linings, retorts, conveyors, muffles, racks, etc. Any item made of Nickel alloy.

Write, Wire or Call

Weinstein Co.

610 W. 8th St.
Jamestown, N. Y.
Phone 61-154

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Complete chrome plating line with minimum tank depth of 42 inches and including power and accessory equipment. State condition, manufacturer & serial number, age, price and location.

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Penton Bldg. Cleveland 13, Ohio

WANT TO BUY
STEEL BY-PRODUCTS DISCS

2" to 2½"	dia.	.060 to .125
4½"	dia.	.060 to .125
6½" to 10"	dia.	.060 to .125
11" to 12½"	dia.	.085 to .095

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Tel. Slatington, Pa. PO 7-3821

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DESIGNERS

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ENGINEERS, DESIGNERS, DRAFTSMEN

experienced in design work on Oil Refineries, Chemical Plants, Heavy Industry or any type of Steel Plant or Steel Plant Equipment design. Applications will be kept confidential.

Send detailed resume and photo to:
G. VICTOR HOPKINS

ARTHUR G. McKEE & COMPANY
2300 Chester Avenue, Cleveland 1, Ohio

Help Wanted

PLANT MANAGER—Must have experience in office & plant—40 men. Monarch Cabinet Corp.—Avenel, N. J.

Positions Wanted

POSITION WANTED: FACTORY MANAGER—SUPT. OF MANUFACTURING—Wide experience in Job Shops and mass produced metal items made of steel, stainless steels, nickel, monel, aluminum, copper, sheet and plate—Manufacturing mass produced items such as water heaters, furnaces and metal furniture. Job shop items such as tanks and general process equipment for chemical and food industries. Familiar with tooling, welding, spray painting, maintenance, estimating, labor relations and general manufacturing management. Available end of September. Will relocate. Reply Box 873, STEEL, Penton Bldg., Cleveland 13, Ohio.

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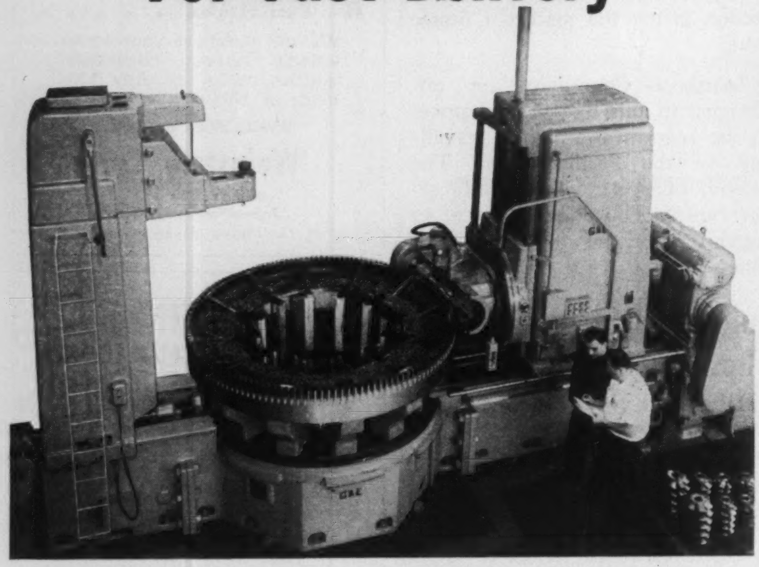

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Face widths up to 42″, depending on helix angle

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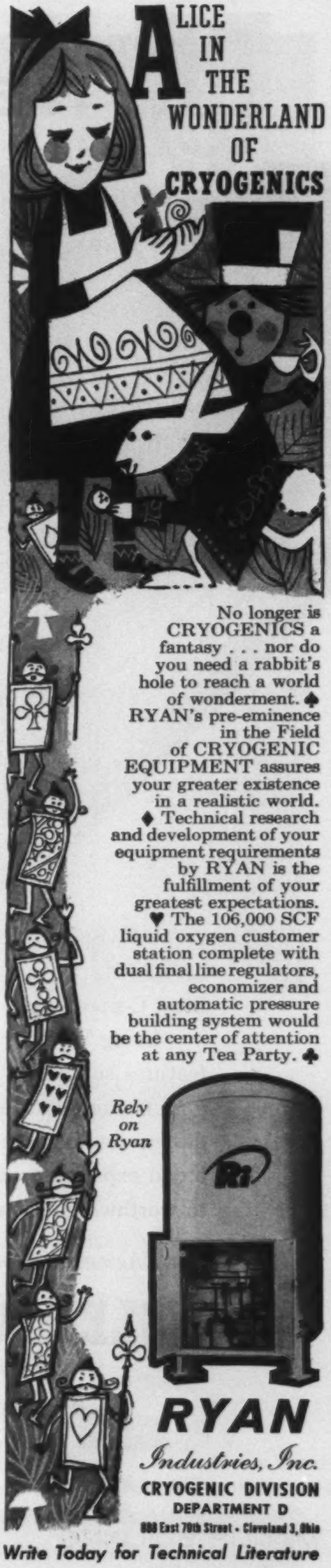
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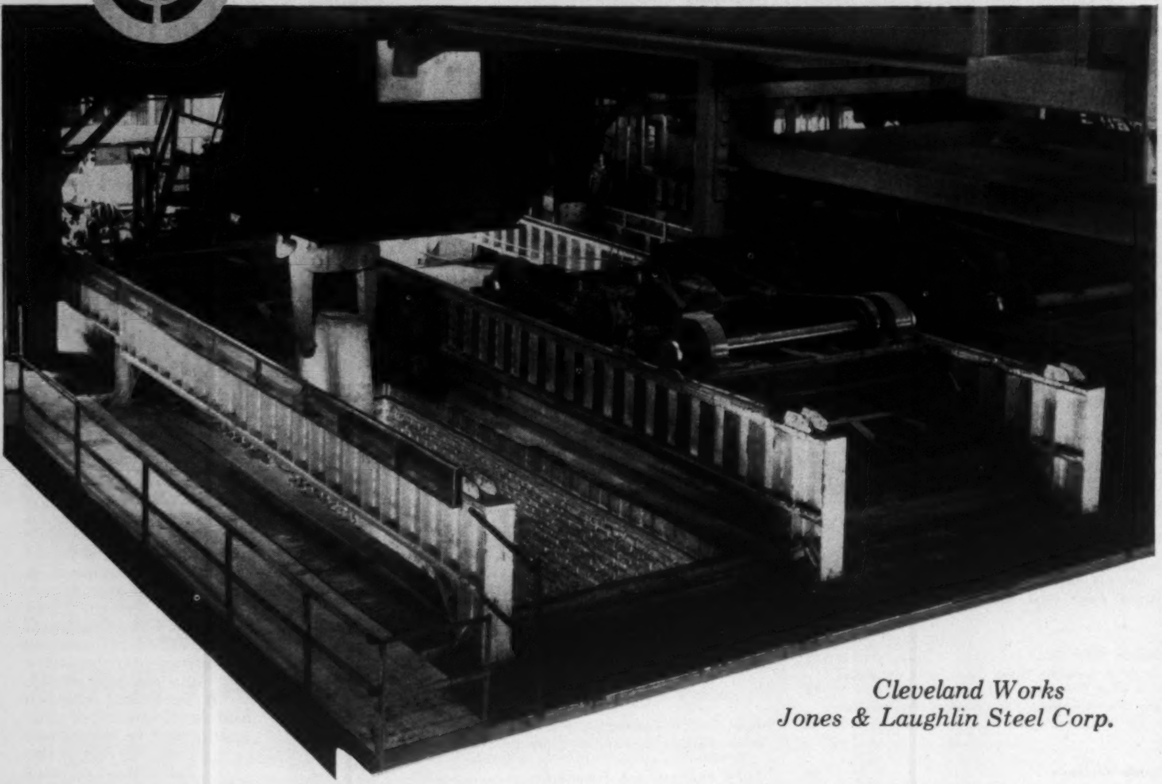
NEW SOAKING PITS



Cleveland Works
Jones & Laughlin Steel Corp.

New Soaking Pits recently built and placed in operation by AMCO® at the Cleveland Works of Jones & Laughlin Steel Corporation.

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Amsler Morton Company is a world-wide leader in the design of soaking pits and other steel heating furnaces. This broad experience and engineering competence can also lead to worthwhile economies in your plant.

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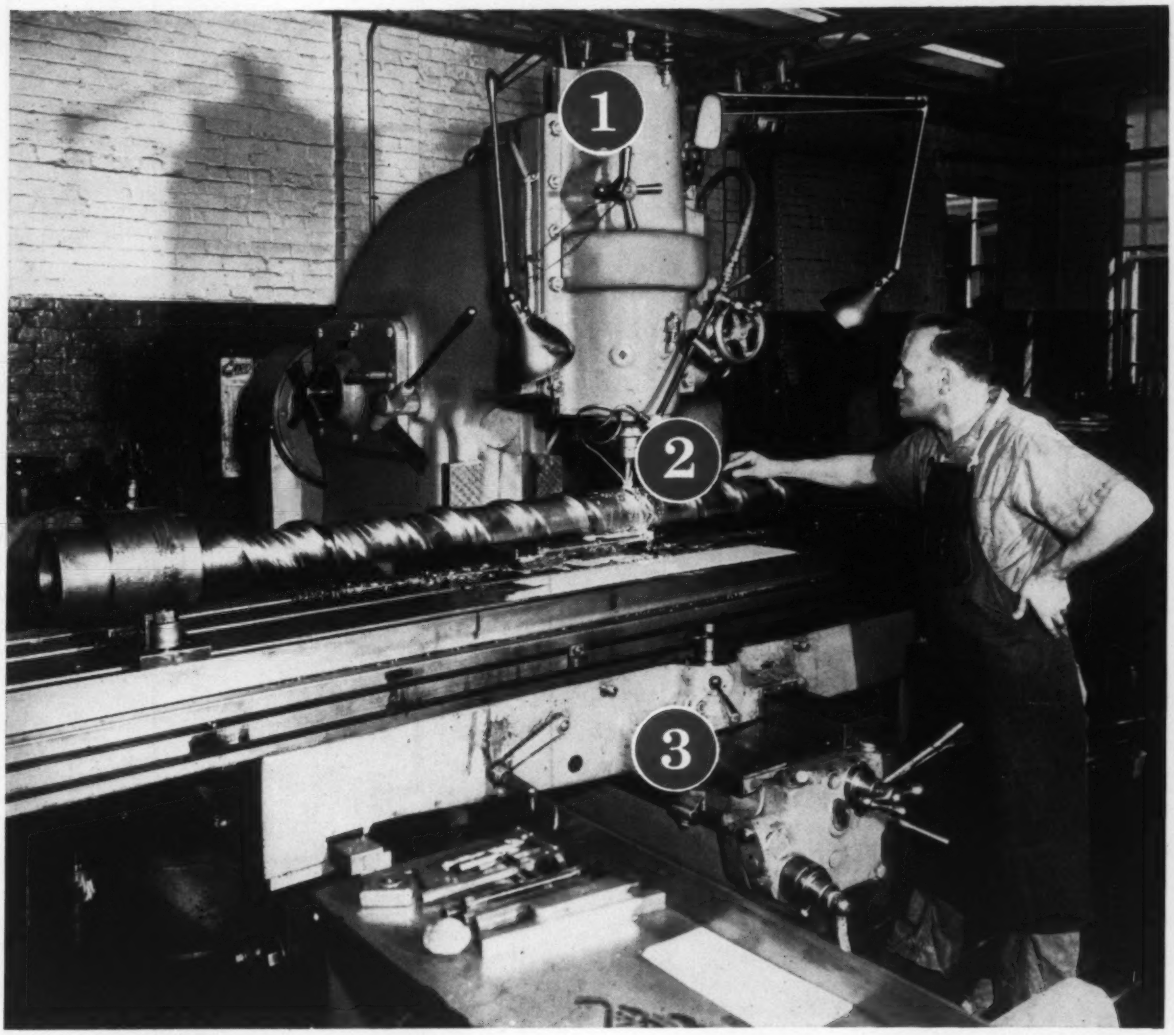

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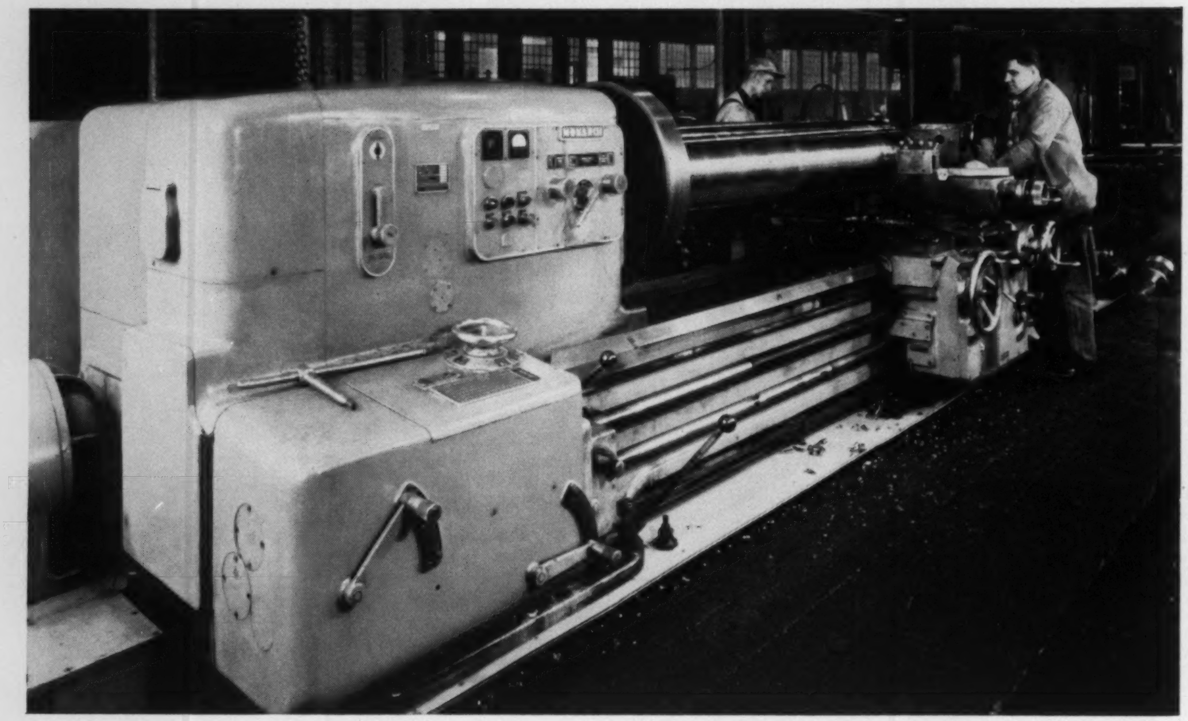
"Dyna-Shift" lathe ups output 25%, tool life 50%, —30 Timken® bearings maintain rigidity, accuracy



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